ELECTRICAL REVIEW

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ELECTRICAL REVIEW

26th DECEMBER, 1952

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872 • VOL. CLI • NO. 3918

Retrospect and Outlook

UPON the whole the electrical industry appears to have maintained its position during the year now closing although gains in some sections have been counterbalanced by setbacks in others. Manufacturers of the heavier types of equipment have generally continued to advance, but difficulties confronting the makers of domestic apparatus have had an adverse effect. Taking turbo-generators as typical of the heavier branch, the average monthly output in the first nine months of the year was substantially above that for 1951 and the same is true of insulated cables and wires. But production of washing machines, vacuum cleaners and kettles, for instance, was much lower than in the preceding year.

This, of course, is largely a reflection of the export situation. Overseas buyers cannot do without capital equipment but they can dispense with domestic appliances or more easily produce them in their own countries. Nevertheless, in spite of the reduction in lighter exports, the greater value of heavier plant exported is expected to raise this year's overall total to about £210 million, against £190 million last year.

Employment in the electrical manufacturing industry naturally follows the production trend. In the electrical machinery branch the total number employed at the end of September was about 186,000, as compared with about 182,000 at the end of 1951, and there were increased numbers in electric cable, and telegraph and telephone works. The total for the group, however, was lower at the end of September than at the close of 1951 (586,000 against 592,000) because of the decline in employment in other sections.

Apart from the restrictive policies of overseas customers the lighter side of the industry has been badly affected by conditions at home, including purchase tax and too-active discouragement of the domestic use of electricity. The effects have been severely felt by the electricity supply industry and the B.E.A. quite recently expressed some " concern " at the position. Strenuous efforts are now being

made to combat anti-electric propaganda, which had reached a fantastic pitch, and there are already some indications of improvement. A reduction of purchase tax on electrical appliances is overdue and an endeavour will again be made to convince the Chancellor of the Exchequer of this fact. It may seem that the electrical industry is not so favourably placed as it has been but there is little reason for despondency. Electricity is still the most potent force in modern life and no bounds can be set to its continued expansion. The rate of that expansion can be accelerated by concentration on the task by all in the industry.

BEAMA CATALOGUE COMMENDED

Tributes to the value of the "BEAMA Catalogue" (see *Electrical Review*, 5th December) were expressed in the House of Commons last week. Mr. Mackeson (for the President of the Board of Trade) told Sir Herbert Williams that a copy had been placed in the library of the House. Mr. Bottomley asked if the Minister would consider drawing the attention of other industries to the way in which the information was presented in the Catalogue—in the language of the country in which it was hoped to sell goods. To this Mr. Mackeson replied that he would; he hoped that hon. Members on both sides of the House would look at the Catalogue. It is very gratifying to have these testimonials to the example provided by the electrical industry in the matter of export promotion.

ELECTRICITY IN SCOTLAND

While the Government has yet to divulge its intentions with regard to electricity supply in Scotland, warning notes continue to be sounded in the North of Scotland. Sir Hugh Mackenzie, vice-chairman of the Hydro-Electric Board, said the other day that unless the entity of the Board was preserved there could be no uneconomic schemes for the supply of power and light in remote Highland districts. He was speaking at the inauguration of a supply at Dores (Inverness-shire) which, he said, would be subsidized to the extent of £2,300 a year. By "ploughing back" profits from other areas the Board was able to develop such uneconomic schemes.

BANKSIDE POWER STATION

The setting to work early next year of the first 60 MW set at the new Bankside power station without its flue-gas washing plant seems unlikely to add to atmospheric pollution in the neighbourhood. Reasons for this view were advanced in our issue of 19th December. Although the multi-duct chimney (in view of its nearness to St. Paul's Cathedral) is shorter than is now usual, special compensatory measures have been adopted to increase the discharge velocity necessary to avoid local concentration of noxious emissions.

TAKING THOUGHT

The natural resources which it is the part of engineers to utilize most efficiently include, of course, human effort. In the Andrew Laing Lecture (North-East Coast Institution of Engineers and Shipbuilders) Mr. Hayne Constant pointed out that, while to make experiments was not difficult, to gain worth-while knowledge from them called for the exercise of thought at the highest level. Any consequent delay would receive more than adequate compensation in a correct interpretation of experience leading to the elimination of non-essentials and hence to a narrowing of the field of inquiry and simplicity of design.

SEASON'S GREETINGS

We extend to all our readers our best wishes for their health and success during the coming year. We also thank all those who have sent us calendars, diaries and cards.

HOT STRIP ROLLING

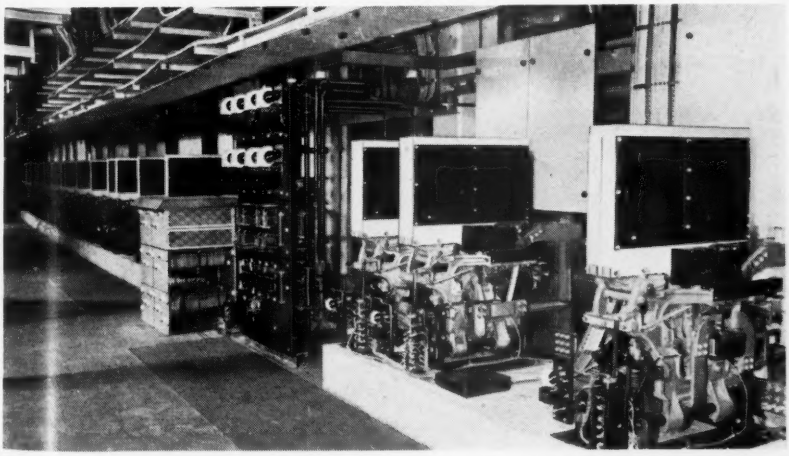
Part 2.—The Finishing Stands at the Port Talbot Works

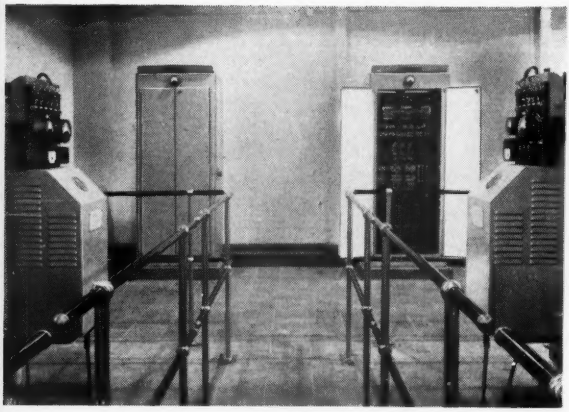
In our last issue we dealt with the initial electrical applications to the hot strip rolling operations, covering, in the main, the roughing stands or preparation of the slabs for the continuous rolling. We now deal mainly with the actual continuous rolling through the train of finishing stands

In each of the first two stand drives in the continuous rolling train power transmission is through gear boxes, while in each of the last four drives the motor is directly coupled to the pinion stands. When all the motors are running their armatures are connected by 3,200 A high speed B.T.H. air circuit breakers, two in parallel for each motor, to an 800 V busbar system. These heavy duty copper bars are fed by a bank of thirty 700 kW B.T.H. six-anode grid controlled pumpless steel tank rectifiers. The latter are arranged in ten groups of three, each group having its own arc suppression panel and high speed circuit breaker for disconnecting it in the event of a fault. The rectifier groups are supplied separately from ten 11,000/800 V rectifier transformers which operate in pairs from five oil circuit breakers.

Series reactors are connected between the oil circuit breakers and the transformers to limit short circuit currents. Four autotransformers connected in these five circuits provide a progressive phase displacement between each supply section to a pair of main transformers, the overall rectification obtained by this method being 60 phase. The volts on the main busbar system are raised by means of motor operated phase shifters, controlled from the main pulpit, which alter the phase displacement on the

When running, the armatures of the finishing stand motors are connected by 3,200 A high speed air circuit breakers, two in parallel for each motor





Each group of three rectifiers has its own arc suppression panel nearby

of the a.c. supply and motor loads. The rectifiers and motors have special ventilating systems which operate on the air recirculation heat exchanger principle. The control circuits are arranged so that before the main oil circuit breakers can be closed all the safety circuits must be operative, any failure being indicated by the central annunciator system audible alarms. The complete rectifier installation was supplied by the British Thomson-Houston Co., Ltd.

Because of the inherent inability to deal with regenerative current in a rectifier system all the main motors have voltage graded dynamic braking circuits. These provide rapid deceleration whenever the motor circuit breakers trip.

High speed relays are employed for protection during rectifier "back-fires," etc., or during rapid motor current changes, in addition to the inverse time overloads normally employed. All control equipment is supplied by an 18 kW generator which is duplicated for stand-by and governed by an electronic regulator.

Full indication of the rectifier and motor air circuit breaker positions is afforded by lamps in the motor room and on the main pulpit desks. Large-dial rear-illuminated ammeters and speed indicators are mounted on a large panel near floor level under the main operating pulpit for use by

grids of the main rectifiers, thus permitting them to supply power to the motors which are already connected by their circuit breakers.

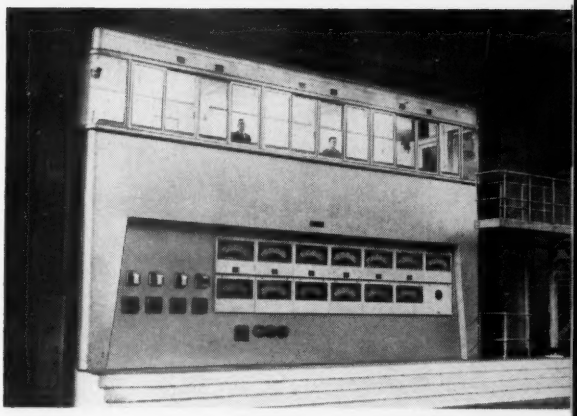
When the motors commence to turn the voltage gradually rises until there is about 600 V on the bars. At this point the phase shifter finishes its operation and the voltage rises under the influence of a saturable reactor and an electronic regulator. This regulator, which employs thyratrons, is designed to maintain the required 800 V for the d.c. supply to the motors to within $\pm$ 1·5 per cent for normal variations

Thirty 700 kW six-anode grid controlled pumpless steel tank rectifiers supply power for the finishing stand motors

the mill operators at floor level.

The use of rectifiers, as against motor generators, for this type of supply leads to reduced capital costs, simpler structures, higher efficiency and less maintenance. On the other hand, rectifiers cannot deal with regenerative power and the input power factor is somewhat poorer, especially at zero busbar voltage when the rectifiers are heavily suppressed.

The control pulpits used throughout the strip mill are completely enclosed, soundproof, double skin heat insulated structures. They are equipped for fluorescent lighting inside, but normally this is not used because most of the desk instruments are rear illuminated. Pulpits which are in hot situations are cooled by means of refrigeration equipment.



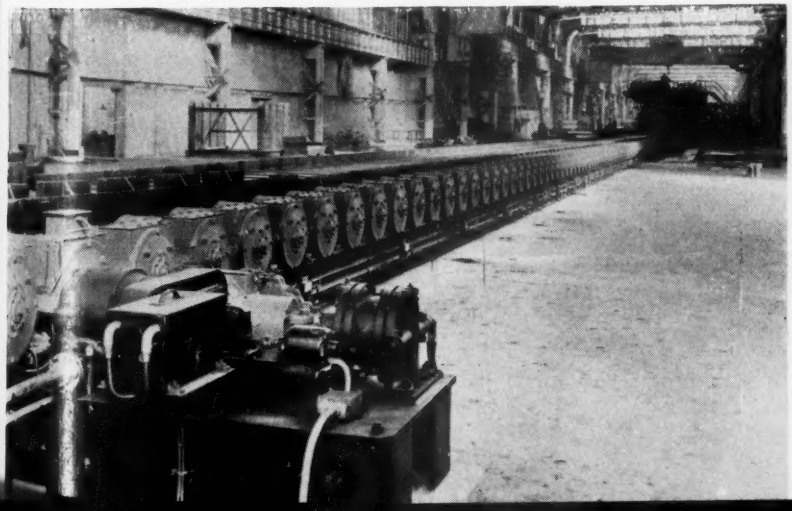
Large-dial ammeters and speed indicators are mounted under the main operating pulpit

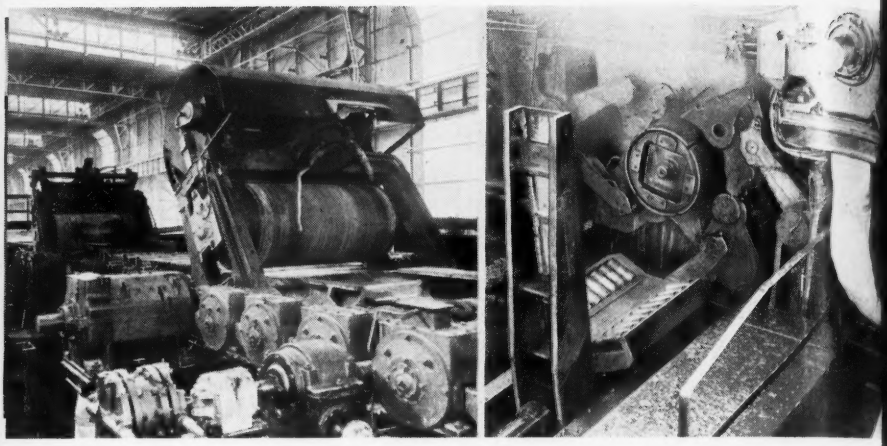
The strip emerges from the last stand of the continuous rolling train and immediately passes through a rotary flying shear. This machine is driven by two 150 h.p. 0/1,100 r.p.m. shunt wound Ward-Leonard controlled motors, with a 30in " M " type shunt brake and a rotary limit switch.

The motors are capable of extremely high rates of acceleration and are cascade controlled to provide accurate front and tail cropping or shearing to length. When cutting to length the shear drum may rotate at speeds high enough to cause the blades to move at more than twice the strip speed. The top and bottom drums are of different diameters, causing the blades to meet at every fourth revolution of the top drum.

The machine is automatically started by the passage of the strip through the train of stands, and strip leaving the last stand automatically stops the rotation of the shear. Electronic control is incorporated in this scheme to give rapid response for stabilization. From the shear to the hot strip downcoiler stretches the hot run-out table which comprises 180 rollers each 80in long by 12in diameter. The rollers are individually driven by 1·6/4·3 h.p. 750 r.p.m. continuous

The run-out table rollers between the roughing stands and the finishing stands are individually driven by Ward-Leonard controlled motors





Left: **Pinch rolls deflect the head end of the strip down through a slot to the rotating mandrel of the coiler.** *Right:* **Four wrapper arms are closely clustered around the down-coiler mandrel**

rating shunt wound d.c. motors, Ward-Leonard controlled by means of four 170 kW 1,000 r.p.m. motor generator sets.

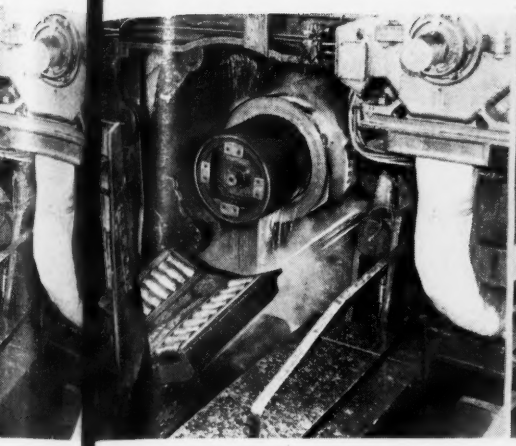
There are four groups of 45 rollers between stand F.10 and the coiler, each group having its own supply generator. Beyond the coiler there are two more groups of 63 rollers, each extending to the hot sheet piler. The generators for these groups are used on the coilers when strip is being rolled. All the tables are arranged for forward and reverse inching and running. The first group from stand F.10 is controlled from the continuous train control pulpit and the remainder from the coiler control pulpit.

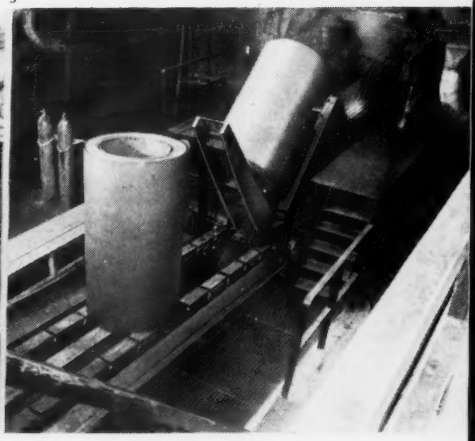
After passing over the run-out tables and at about 300ft from the last stand of the continuous train the strip reaches the two down-coilers. But first the head end of the strip meets a pair of inclined pinch rolls which deflect the head end down through a slot to the already rotating mandrel which has four wrapper units clustered closely around it. The strip forms around the mandrel, and after a few turns the wrapper arms are withdrawn by means of air cylinders operating from solenoid controlled air valves.

As the tail end of the strip approaches the coiler, the wrapper arms are again brought into position and remain in to " iron out " the strip as it goes round the mandrel. The wrappers again move away, and the mandrel is so constructed as to collapse under the influence of a hydraulic cylinder. This frees the coil on the mandrel, and a stripper arm, actuated by an air cylinder, moves to eject it on to a waiting coil unloader carriage.

This unloader tilts down and deposits the coil on to a chain type conveyor which removes it to another building. The drives on each coiler equipment are: two 75 h.p. 0/525 r.p.m. shunt wound d.c. motors for the pinch rolls, two 8 h.p. 0/750/875 r.p.m. d.c. shunt wound motors for the wrappers and a 0/300 h.p. 0/300/900 r.p.m. shunt wound industrial d.c. motor for the mandrel. These motors are connected by means of heavy duty coupling contactors to a 350 kW 1,000 r.p.m. Ward-Leonard control generator. All the drives are equipped for dynamic braking in emergency stopping. The coiler can be inched forward and reverse, and run forward.

Interlocks are provided by limit switches to prevent wrong operating sequences, e.g., the wrapper arms coming in when the stripper arm is extended to extrude a coil. The coupling contactors are necessary to allow the generator to be transferred to the end tables when not producing strip. They also provide for rapid disconnection of any drive should it become overloaded or electrically faulty. Both the coiler and the run-out table speeds can be made closely to follow the last stand speed by taking a





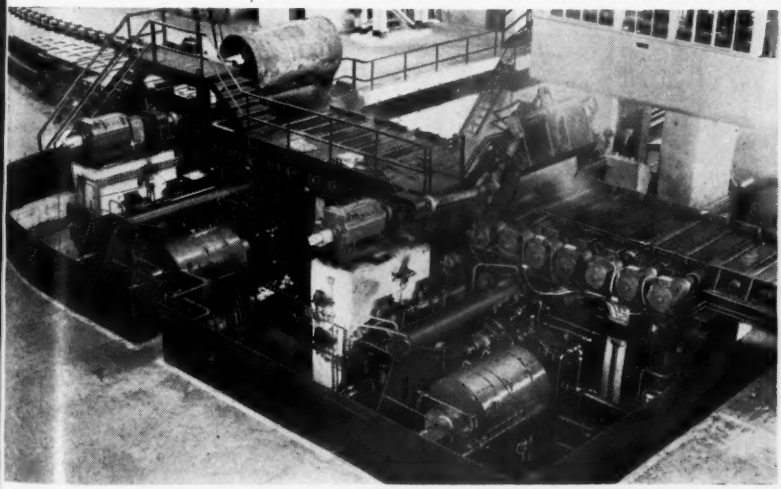
Left: **After a few turns of strip have been made on the mandrel the wrapper arms are withdrawn electro-pneumatically.** *Right:* **An air cylinder ejects the completed strip coil on to a waiting coil unloader carriage**

controlling signal from a tacho generator mounted on the commutator end of the main mill motor.

The coiler speed is usually initially set a little above that of the mill speed and the change in speed when the strip enters the coiler provides a current signal to a special control in the mandrel motor field circuit to cause the mandrel to slow down for the coil build-up.

The pinch rolls normally float on the line, drawing a small motoring current while the strip is still in the stands and changing over to a heavily loaded drag generator to maintain the coil tension when the tail end leaves the last stand and

The mandrel of each of the two down-coilers is driven by a 0/300 h.p., 0/300/900 r.p.m. shunt motor; note also pinch roll drives



approaches the coiler. The wrapper speeds are a little higher than the mandrel surface speeds to facilitate the passage of the strip around the mandrel on entry.

The generators for the run-out tables, the coilers and the flying shear are on a common shaft with a 1,550 h.p. 3·3 kV synchronous driving motor, the exciter for which is at one end of the set. Various exciters forming part of the control system make up sets situated near the main m.g. sets at the south end of the motor room. The panels, with the control and the coupling contactors, are mounted back to back near the main sets.

The unloader has a solenoid controlled air cylinder to move the carriage out after receiving the coil from the mandrel. It is then tilted by its 35 h.p. 625 r.p.m. stabilized shunt d.c. C.V.C. motor. The conveyor, which is of metal link belt construction, is driven by four motors identical with those of the unloader drive. This conveyor transfers the coil to the next building for further processing. Practically all the auxiliary driving motors throughout the production line were supplied by the General Electric Co., Ltd.

The "Farvalube" grease systems previously mentioned are placed at various points in the mill, serving surrounding machines. Each system has a timing clock and measuring device for controlling the grease flow and an audible warning to indicate failure.

The mill is equipped throughout with comprehensive "Loudhailer" and intercommunication systems, the latter having "points" at all the mill control stations. Both of these systems are of G.E.C. production.

The general mill lighting is effected by special B.T.H. high-mounting T891 combined metal filament-mercury vapour fittings.

We are indebted to the Steel Company of Wales, Ltd., for permission to visit the works and to publish this article and to the Electrical Engineering Department for co-operation in preparing it.

Control boards for the generators for the run-out tables, coilers and flying shear are mounted back-to-back near the main m.g. sets

Distribution Transformers

Economics of Loading

By G. O. McLEAN, M.Eng., and R. S. PEACOCK, B.Sc.(Eng.).*

The authors examine the theoretically desirable economic loadings for a range of sizes of distribution transformers, and in a second article will stress the practical value of heat-runs and explain how a loading nomogram can be drawn from test results.

BECAUSE of the lack of coincidence of loading times, particularly between substations supplying industrial load and those supplying domestic load, and because of the need for spare capacity to cope with unexpected loads and breakdowns, it is not possible to limit the total installed transformer capacity to the anticipated demand. The ratio of installed rating to actual aggregate demand is, in fact, over 2·0 at each level of transformation. From discussions with members of the American productivity team visiting England in March/April, 1952, the authors learnt that this ratio in the U.S.A. is 1·3 to 1·5. Numerous articles and reports[1] have been published dealing with overloading of transformers, and an American code of practice[2] gives tables relating operating temperatures with expected life of transformers.

Though transformers are responsible for only approximately 15 per cent of a (rural) distribution Board's capital expenditure, the restriction of capital in recent years supplied a good reason for a fresh examination of what appeared to be a prima facie case of inefficient use (compared with American practice) of capital assets. Is the British engineer extravagant in his transformer sizes, or can a coefficient >1·0 be applied in practice to the manufacturer's maximum continuous rating which is in accordance with B.S. Specification 171? Can we in this country frame our own standard loading guide?

Mr. W. Szwander in his 1945 I.E.E. paper discussed very thoroughly the valuation and capitalization of transformer losses. By using such means and present-day average values for interest and depreciation, demand and kWh charges for capital and energy costs, the authors have investigated the minimum number of sizes which could be carried by an Area Board to give the minimum annual cost if there were no limits to loading. The practicability of loadings obtained theoretically was then tested by back to back trials in the field.

The range of distribution transformer sizes is from 5 to 1,000 kVA, and the authors found it convenient to split this into three

* Both authors are with the South Western Electricity Board but the views expressed are purely personal.

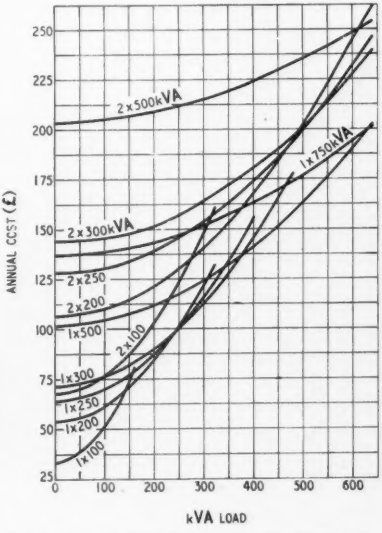


Fig. 1.—Annual cost/load curves for three-phase ground-mounted transformers, 100 to 500 kVA; load factor 0·4

groups with standard medium voltage secondaries (433/250 V), viz.: 5 to 50 kVA single-phase pole-mounted; 25 to 200 kVA three-phase pole-mounted; and 100 to 1,000 kVA ground-mounted.

For each group of transformers the total annual charges derived from the capitalization formula and using a loss load factor of $0{\cdot}2L + 0{\cdot}8L^2$ were plotted against the total load at a substation consisting of either one or two transformers. In all cases where there were two transformers the figures for the total charges on both transformers when they were sharing the particular load were used. The results for load factors of 0·2, 0·4, 0·6 and 0·8 were invariably of the type shown in Fig. 1.

For each of the four assumed load factors and each size of transformer a curve is obtained and the minimum annual cost is given by the envelope of all the curves. This envelope tends to a straight line for an average load factor of 0·4 for the range of ground-mounted three-phase transformers from 100 to 1,000 kVA and can be written: annual cost (in £) = 25 + 0·26 kVA. This formula gives an easily remembered yardstick for the cost of transformation when one is faced with the problem of ever-extending supply lines and the need to cut losses by higher voltage injection. The points of transition from one curve to the next could be termed the maximum economic load for the smaller size and the minimum economic load for the larger size of transformer.

Investigation showed that irrespective of size of transformer the maximum economic load was inversely but rigidly and almost identically proportional to system load factor. In other words, on squared paper there would be a straight line from 160 per cent full load and 0·2 load factor to 75 per cent full load and unity load factor.

Load Factor and Size

The next step was the examination of the theoretical results in a practical light. If the average annual load factor of a large area is, say, 0·4, it is almost certain that load factors of individual transformers will vary from 0·2 to 0·8, depending on the locality and the type of load served. For instance, with single-phase pole-mounted transformers of from 5 to 50 kVA, the need is to supply small farming or rural loads, and though typical load curves are not readily available because current transformers are not standard fittings, it is felt that 0·2 is a reasonable load factor. For these conditions, the theoretical economic loading indicated for a size range of 5, 15, 25 and 50 kVA was to keep the smaller size on load up to 200 per cent of maker's rating before changing to the larger size. Even for 0·4 load factor, peak loads of 140 per cent are economically justified.

The 5 kVA transformer presents a special problem in that the economics of its use are such that the cost of overhead lines at different voltages has a much greater influence on the aspect of selection than the cost and losses of the transformer itself. Unless the transformer is heavily loaded, the revenue from a scheme involving the use of this size, such as a spur supply to a farm, is so small that the capital expenditure compared to revenue is very high. On the other hand, an adequate revenue is obtained under the conditions where, say, 200 per cent loading has to be considered. The losses then begin to approach those of a 15 kVA unit, and with these onerous conditions of service on the 5 kVA unit, its poor regulation and the lack of any further capacity for load development make its usefulness rather doubtful.

The desirable scheme is to connect small groups of load of not less than 10 kVA, but unfortunately these conditions are not always to be found, so that a small "specialized" field may be increasingly available for the 5 kVA unit, although even under the typical condition of a peak load of 7 to 10 kVA, with a peak of short duration, a 10 kVA unit might be preferable.

In general, the transformers in this group can best operate over a range starting at 70 to 90 per cent of full load rating, and can be economically overloaded up to 150 to 170 per cent provided the life of the transformer is not appreciably reduced, which aspect will be discussed later.

In the second group—three-phase pole-mounted transformers of 25–200 kVA—the load factor on individual transformers will probably be slightly higher but would probably not normally exceed 0·3 or 0·4. Again, from the theoretical angle, very consistent results are obtained, indicating that installation when the load is 80 per cent full load rising to 160 per cent gives the most satisfactory theoretical loading.

As already indicated, the maximum economical loading varies inversely with

the load factor. A low load factor indicates a high peak, possibly of relatively short duration for a given annual demand. This, fortunately, means that under the conditions of low load factor, where overloading is more desirable, the thermal effect of the high loading at peak is reduced, due to the relatively low load before and after peak and/or to the shortness of duration of the peak; it is therefore more practicable to overload where it is economically desirable to do so. In the authors' view, three sizes (25, 50 and 100 kVA—i.e., a size increase coefficient of 2·0) satisfactorily fulfil the requirements of this group.

The use of pole-mounted transformers above 100 kVA is desirable economically if handling costs are ignored, and the investigation indicated that the next larger size to be considered is the 200 kVA unit, the average weight of which is 1·7 tons. The cost of mounting and the practical difficulties unless crane facilities are obtainable may be the deciding factors. This size is considered to be the practicable limit for pole mounting.

For the third group—three-phase outdoor ground-mounted transformers—available data indicate a load factor of about 0·3 to 0·4 when supplying a domestic load. The investigation showed the minimum economical load to be of the order of 70 to 80 per cent, with a maximum value of about 120 to 150 per cent at load factors of 0·2 to 0·4, while at a load factor of 0·6 the maximum economical loads for 200, 300 and 500 kVA units are only about 100 per cent. This indicates a size increase coefficient of 1·6 at the lower end and 1·4 at the upper end of the group.

The 100 kVA transformer (the lowest in the group) is not used on a large scale, but the saving of approximately £15 per annum at a load of 70 kVA, as compared with a 200 kVA transformer, indicates that its installation in a substation where load growth is expected to be slow at first may be justified for a few years.

The investigation threw new light on a constantly recurring problem of the supply engineer. Is it more economical to add another transformer of the same size to cope with a rising demand or to change to a transformer of twice the size? Fig. 1 shows the answer clearly, namely, that provided adequate stand-by transformer capacity is available there is a heavy additional cost in running two units in parallel as an alternative to a single transformer of higher rating. This applies to a varying degree in all groups. The investigation also showed 100, 200, 300 and 500 kVA to form a more economical group than 100, 250 and 500 kVA, although the latter has one transformer fewer to cover the range and the degree of overloading on the 250 kVA unit is slightly higher than on the 300 kVA unit.

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Resistance Thermometer Elements

THE British Standards Institution has just issued B.S. 1904 : 1952 which deals with commercial platinum resistance thermometer elements and is one of a series of British Standards being prepared in relation to temperature measurement. It specifies requirements for temperature-sensitive resistance elements made of platinum foil, strip or wire, usually contained in a sheath forming a thermometer bulb, and used with suitable electrical indicators, recorders and controllers for a variety of industrial purposes. The standard also includes tests for stability and behaviour under vibration. Copies are obtainable from the British Standards Institution, Sales Branch, 24, Victoria Street, London, S.W.1, price 2s 6d.

NEW BOOKS

Electrical Measuring Instruments. By C. V. Drysdale and A. C. Jolley. Second edition revised by G. F. Tagg. Pp. 598, figs. and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 75s.

This book is a revised edition of Part I of the well-known standard work which was first published in 1924. The opening chapters deal with the general principles of operation of indicating instruments, together with some discussion of the electrical and mechanical considerations of practical instrument design and construction. This is followed by chapters on the fundamental principles of electricity and magnetism and a survey of the electrical and mechanical properties of the materials used in modern instrument construction. The remainder of the book is devoted to a detailed discussion of the characteristic features of the moving coil, moving iron, dynamometer, hot-wire and electrostatic types of instrument.

It is unfortunate that the revising author did not fully avail himself of the opportunity to bring many of the symbols used in the book into line with modern practice. Thus we find δ, S and ϵ instead of the more commonly used symbols D, E and Q for electric flux density, electric intensity and electric charge.

We also feel that a significant advance would have been made if the text, which will undoubtedly serve as a standard work for many years, had been re-written using the rationalized M.K.S. system of units, although it is probable that the revision was completed before this system was officially adopted.

With the exception of these two comparatively minor criticisms, the book is lucid, authoritatively written and contains much useful data which would not otherwise be readily available.—H.B.W.

Electrical Instruments, Meters and Electronic Control. Edited by E. Molloy. Pp. 196; figs. 197; index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 17s 6d.

Several vast subjects are covered in 196 pages, and a creditable attempt it is, but it must be considered in the light of this serious limitation.

The sections are well set out but, since allied subjects are dealt with, they tend to cover the same ground in basic principles as each section author works up to his theme. This remark can be said to be true of the four sections on Instruments and the two on Supply Metering.

It may be open to doubt whether the theory, construction, testing and, ultimately, the certification of supply metering is of great value in a book of this type for, unless very fully dealt with, misunderstandings in the mind of the reader are likely to arise, particularly if he is not closely in touch with the provisions of the Electricity Supply (Meters) Act, 1936.

With regard to electronic control, the book covers very useful ground where development has been so rapid that many engineers have difficulty in keeping in touch. It is here, too, that the accent on application rather than intensive technical explanation will be of the greatest value. The sections on electronic control of motors and light-sensitive cells in industry are particularly enlightening.

Illustrations right through the book are of a high order and one can conclude by saying that this work generally will be of interest on the engineer's desk, chiefly for its broad terms of application, and for the technician who needs to keep in touch with modern trends. It does not of course cater for the serious student.—H.E.L.

Books Received

Modern Electric Lamps. By D. A. Clarke. Pp. 205; figs. and index. Blackie & Son, Ltd., 17, Stanhope Street, Glasgow, C.4. Price 20s.

Men and Discoveries in Electricity. By Bryan Morgan. Pp. 185; figs. and index. John Murray (Publishers), Ltd., 50, Albemarle Street, London, W.1. Price 8s 6d.

Refrigeration Notebook. By M. E. Anderson. Second edition. Pp. 274; figs. 34; index. Leonard Hill, Ltd., Stratford House, Eden Street, London, N.W.1. Price 12s 6d.

Major Faults on Power Systems. By A. G. Lyle. Pp. 355; figs. 94; index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 45s.

VIEWS on the NEWS

By REFLECTOR

I READ in the *Manchester Guardian* that a Lincolnshire farmer had erected wires over his fields to secure telephone service under the farmers' self-help scheme introduced by the Post Office some time ago. This scheme was news to me. It was explained by the Lincoln telephone manager (Mr. F. O. Watson) that the plan was introduced to help farmers and others who live in remote areas. Mr. Watson said that it did not matter where the wire was fixed so long as a good job was made of it. A reduction in rent was given in proportion to the distance the wires had to be carried. Some farmers may regret that they cannot put up electric lines in a similar fashion but the technique is somewhat different, of course.

* * *

Hull forms a unique telephonic island, having remained outside the national system since it acquired the local service from the National Telephone Co. many years ago. Although it appears to operate in much the same sort of conditions as the Post Office telephone service its charges are more favourable. The *Economist* has investigated the matter and has been unable to arrive at definite reasons for Hull's lower rates. Its article on the subject concludes: —

> "But if the outsider cannot see why Hull's telephones should be cheap and profitable, the typical Hull citizen has no doubts: 'Why, the thing is run on sound business lines,' he exclaims, and leaves the implication in the air."

I feel that the Post Office should not let the matter rest there.

* * *

It will be interesting to have further details of the domestic electrical development which seems to be going on at a Lincolnshire steelworks. If the Hull *Daily Mail* reports correctly, the people at these works are bringing "home made" fires and cookers with them and "tap high voltage cables to get them working." The newspaper is right in describing this as running a grave risk. The matter is being investigated by the Scunthorpe and District Industrial Accident Prevention Council and will be discussed in full at the Council's next meeting.

* * *

British Railways announce that nearly 900 stations and depots are to be brightened for Coronation Year at a cost of over £1,000,000. It seems that the "brightening" will be done mainly by means of paint, and goodness knows some stations badly need painting, but it is to be hoped that something will also be done about the lighting. Far too much gas lighting remains and even where electricity is used it is too often of inadequate wattage and ill applied.

* * *

Occupants of a house near Newcastle (Staffs) are reported to be deriving a gas supply from their garden. It is said to be stronger than "nationalized" gas. Similarly there are people who consider "private" electricity to be superior to the nationalized kind. I suppose it is largely a matter of political colour.

* * *

Head teachers of schools in Richmond and Barnes (says the *Thames Valley Times*) are to receive a letter from the Northern Divisional Executive advising them of the need for economy in electricity. This is a very justifiable move but what is not so justifiable is the remark of a member at a meeting of the Executive. The Rev. Helby Chambers is reported to have said that what was wanted was "the attitude of mind that the prime purpose of a switch was to turn off and not on." It is certainly the attitude of mind that the electricity supply industry itself has helped to produce and it shows how necessary more positive propaganda has become.

PERSONAL and SOCIAL

News of Men and Women of the Industry

A PRESENTATION has been made to **Mr. C. J. Bullock**, assistant district engineer at Crook (Co. Durham) for the North Eastern Electricity Board, to mark his impending retirement after thirty-nine years' service. On behalf of the office staff, Mr. N. Blackett, district engineer, presented Mr. Bullock with a wallet and books.

Mr. H. P. McConway has just completed fifty years' service with A. Reyrolle & Co., Ltd. He joined the company in December, 1902, and after serving his apprenticeship went into the drawing office until 1914, when he joined the 16th Battalion of the Northumberland Fusiliers, later transferring to the Tyneside Irish in which he attained the rank of captain. On returning to the company in 1919 he joined the Purchasing Department as assistant manager, and became purchasing department manager in 1931, the position he still holds.

Mr. H. P. McConway

Mr. Maxwell Woosman has been elected vice-chairman of Richardsons, Westgarth & Co., Ltd., and **Mr. A. Kinsman** and **Mr. R. M. Atkinson** have been appointed directors.

By mutual agreement **Mr. S. Harper Bill**, D.S.C., B.Sc.(Eng.), is relinquishing his position with the General Accessories Co., Ltd., and British Mechanical Productions, Ltd. He was managing director of the General Accessories Co., Ltd., and a director of British Mechanical Productions, Ltd., before the acquisition of these companies by the Edison Swan Electric Co., Ltd., at the end of 1951. Since that time he has been acting in a commercial advisory capacity. From the end of January next **Mr. J. A. C. Kendle**, sales manager of the Wiring Accessories Department of the Edison Swan Electric Co., will be assuming the duties which Mr Harper Bill has carried out during the past year.

Mr. S. Harper Bill

Mr. Harper Bill has completed 50 years in the electrical industry. After graduating from Birmingham University he spent several years in the United States, India, the Belgian Congo, Persia and Mesopotamia. He held a commission in the Royal Naval Volunteer Reserve from 1908 to 1931 and was on active service throughout the 1914-18 war, being one of the first to be appointed electrical officer in the Royal Navy in 1916. From 1926 to 1942 he was chief engineer to Slough Trading Estate and the Birmingham Factory Centre, positions which he relinquished when he became managing director of the General Accessories Co Mr. Harper Bill will continue his consulting practice from his home, 24, Chandos Road, Redland, Bristol.

Capt. R. T. Paul, C.B.E., R.N. (ret.), A.M.I.E.E., has joined the Equipment Division of Mullard, Ltd., as commercial manager, co-ordinating the activities of the three product groups—radio, telephone and electronic equipment. Capt. Paul's career in the Navy included acting as chief signal and radio officer to the Allied Naval C.-in-C., Expeditionary Force, and he was responsible for the naval signal, radio and radar organization for the Normandy invasion. Later he was in charge of the naval wireless network and was the first chairman of the Western Union Communications Committee (Naval). His last naval appointment was as captain of the R.N. Air Station at Yeovilton and Henstridge.

Capt. R. T. Paul

Mr. L. C. Bingham, general sales manager of Venner, Ltd., and Venner Accumulators, Ltd., left London on 18th December on a two months' tour of India and Pakistan.

In celebration of their diamond jubilee, the directors of **J. H. Tucker & Co., Ltd.,** entertained a large number of present and past employees to a dinner and dance at their Tyseley works on 13th December. The toast of the company was proposed by Mr. W. E. Babb, of B.E.A.M.A., a past employee, who in tracing the growth of "Tuckers" over the years referred to the sound training which had enabled many employees subsequently to carry positions of executive responsibility in the electrical industry. In reply, Mr. J. B. Tucker, managing director, gave some personal recollections from the days when as a small boy he was taken by his father, the founder of the company, to the earlier premises in Ryland Street, Oozells Street and Sampson Road North, before the present site was developed. Advantage was taken of the assembly of area sales representatives from all parts of the country to hold a sales conference during the week of the jubilee celebrations.

Directors, executives and outside sales representatives of J. H. Tucker & Co., Ltd. The photograph was taken at a sales conference during the company's diamond jubilee celebrations

Mr. Richard Dawes has been appointed comptroller of Electric & Musical Industries, Ltd. He joined the Parlophone Company Accounts Department in London in 1928, and has been associated continuously with companies of the E.M.I. Group since that date, becoming group accountant to E.M.I. and its subsidiary companies in 1946.

Mr. S. T. Gibbons, who has been appointed secretary of Electric & Musical Industries, Ltd., has been associated with companies of the E.M.I. Group since 1916. He originally joined the Columbia Co., in charge of the general offices of the factory at Wandsworth, and when E.M.I. was formed in 1931 by the merger of The Gramophone Co., Ltd., and Columbia Graphophone Co., Ltd., he went to Hayes in charge of the E.M.I. Accounts Department. Subsequently he became assistant secretary of the company and secretary of a number of the company's English subsidiaries.

Mr. R. Dawes

Mr. S. T. Gibbons

Mr. David Cleghorn Thomson, M.A. (Edin.), B.A.(Hons.) (Oxford), has been appointed director of welfare of the British Electricity Authority. He succeeds Mr. J. W. Thomas, who retired last September. Mr. Thomson, who is a native of Edinburgh, was until recently one of H.M. inspectors in further education for the Metropolitan Division. He has had considerable practical experience in industrial education and training work and has been responsible for several publications on industrial education and training. After several years in journalism and publishing, he held various appointments. As chief education officer of Richard Thomas & Baldwins, Ltd., he set up an education and training department and established a comprehensive plan for training and apprenticeship. He was also a member of the Recruitment and Training Committee of the British Iron and Steel Federation. Later he was, for a period, director of the B.B.C. Scottish Region.

Mr. William Casson, M.I.E.E., technical engineer, Eastern Division of the British Electricity Authority, has been appointed system design and development engineer in the Transmission Design Branch at headquarters. After serving as an apprentice with the Blackpool Corporation Electricity Department, Mr. Casson joined the Metropolitan-Vickers Electrical Co., Ltd., as meter, instrument and relay test assistant. In 1930 he became concerned with the construction of the grid as outside testing and commissioning engineer in Central Scotland and North-West England

with Kennedy & Donkin, consulting engineers. Four years later he joined the Central Electricity Board as senior engineer in the Technical Department of the South-East England District in which he was subsequently promoted to the post of chief assistant technical engineer. On the reorganization of the electricity supply industry in 1948, Mr. Casson took up his present position in the Eastern Division.

Mr. E. E. Burnside, A.M.I.E.E., manager of the X-ray tube and valve works of Newton Victor, Ltd., at Finchley, has retired in his fiftieth year of service with the company. Mr. Burnside, whose entire career has been associated with the X-ray industry, became a member of the Roentgen Society in 1905 and after its incorporation with the British Institute of Radiology served as a Council member of that body for many years (five of them as its honorary treasurer). He is succeeded as works manager at Finchley by **Mr. N. C. Cordingley**, O.B.E., M.Brit.I.R.E.

Mr. E. E. Burnside

Miss D. M. Aldridge has just completed twenty-five years' service with Hoover, Ltd., at Perivale. To mark the occasion Mr. J. A. Wykes, deputy managing director of the company, has presented her with a gold watch. Miss Aldridge is secretary to Mr. A. G. Colston, technical sales manager and a director, Hoover (Electric Motors), Ltd.

Miss Patricia Bennett of the Typists Department at the Trafford Park works of Lancashire Dynamo & Crypto, Ltd., was chosen "Miss Dynamo 1953" at the Works Christmas dance. The judges were Mr. R. McGill, managing director of the Sterling Varnish Co., Mr. Bullivant (a director of the same company) and Mrs. Bullivant. The retiring "Miss Dynamo" was presented with a rhinestone brooch.

The Council of the Institute of Metals has awarded the Institute of Metals (Platinum) Medal for 1953 to **Professor Georg Masing**, of the Institut für Allgemeine Metallkunde, Universitat Göttingen, in recognition of his outstanding contributions in the field of metallography. The Rosenhain Medal for 1953 has been awarded to **Dr. C. E. Ransley**, of the research laboratories, British Aluminium Co., Ltd., in recognition of his outstanding experimental and theoretical work on gas-metal equilibria.

A children's Christmas party was held on 13th December at the Walthamstow works of **Asea Electric, Ltd.**, and was attended by some 200 children between the ages of five and twelve. Following tea there was a film show and Father Christmas made his customary call. A further 200 gifts were distributed to employees' children outside the party age group.

Mr. Wilfrid Hartley, a director of Drake & Gorham (Contractors), Ltd., has retired.

Mr. P. Hamilton Smith has been appointed by Higgs Motors, Ltd., as technical sales engineer in the Hull district.

From 8th to 13th December, the **G.E.C. Musical Society** presented in the theatre at Magnet House, Kingsway, London, W.C.2, the pantomime "Bluebeard," which proved very successful and was attended by some 1,200 people.

About 320 recently attended a Christmas party given by **W. T. Glover & Co., Ltd.**, for employees' children. The function was attended by the Mayor and Mayoress of Stretford. The children were entertained with a Punch and Judy show, films, games and singing, each child receiving a present from Father Christmas.

In 1934 **Queen Mary College**, London, was granted its Royal Charter, and to celebrate the anniversary of this occasion there was a general assembly on 18th December of all persons connected with the college. During the ceremony Lt.-Col. Sir Albert Stern, K.B.E., C.M.G., D.L., M.A., chairman of the governing body, was admitted as an Honorary Fellow of the college and three others were admitted as Fellows. These were Dr. S. Whitehead, director of the Electrical Research Association, who has also just been elected vice-chairman of the Committee of Directors of Research Associations, Dr. B. Ifor Evans, M.A., D.Lit., Provost of University College, and Mr. A. D. Mitchell, D.F.C., F.R.I.C., who for 16 years has been assistant editor of the *Journal* of the Chemical Society.

Dr. S. Whitehead

OBITUARY

Mr. John Glover Robb, M.I.E.E., F.Inst.P., former deputy engineer-in-chief of Marconi's Wireless Telegraph Co., Ltd., and chief of the company's research laboratories at Baddow, died on 16th December at the age of sixty-two. Mr. Robb joined Marconi's in

1909, and almost immediately went to Argentina where he remained for two years. In 1913 he was appointed engineer-in-charge of the transatlantic station at Louisburg, Nova Scotia. From 1915 to 1919 he served in the R.N.V.R., and was afterwards engaged in research work both in Canada and Britain with such Marconi pioneers as Captain H. J. Round and Mr. C. S. Franklin, principally on short-wave beam broadcasting and telephony. He was connected with the running and erection of Admiralty direction finding stations.

In 1934 Mr. Robb was appointed development manager to the company, a year later research and development manager, and in 1939 technical manager and director of research. He was appointed deputy engineer-in-chief in 1947, and in the following year became head of a new engineering division designed to exchange technical knowledge between Marconi companies at home and overseas. He retired in 1950.

WILLS

Mr. G. Morgan, M.I.E.E., formerly general manager of the Glasgow Corporation Electricity Department, and latterly a part time member of the South West Scotland Electricity Board, who died on 25th August, left personal estate in England and Scotland valued at £7,325.

Mr. C. J. A. Gill, manager of the Falmouth depot of the Marconi International Marine Intercommunication Co., Ltd., who died on 29th May, aged sixty-two, left £2,459 gross (£2,358 net).

Mr. H. Bedson, B.Sc., A.M.I.E.E., for many years principal of the Burslem, Fenton, Longton and Tunstall Technical Schools, and a lecturer at the North Staffordshire Technical College, who died on 23rd August, left £5,669 gross (£5,599 net).

Mr. R. A. Jones, A.M.I.E.E., director of Jones & Jennings, Ltd., electrical contractors, who died on 27th September last, left £7,995 gross (£7,823 net).

Mr. F. Wallis, M.A., M.I.E.E., retired assistant chief engineer to the English Electric Co., Ltd., who died on 18th September, left £6,353 gross (£6,303 net).

Mr. A. R. McClelland, a director of Falk, Stadelmann & Co., Ltd., who died on 14th July, left £12,859 gross (£12,757 net).

Oil Drilling Barge

An Unusual Launching of a Diesel-Electric Craft

THE first diesel-electric barge to be built and equipped in the United Kingdom was launched on 15th September at Port Glasgow and will be used for oil drilling operations for the Shell organization in Lake Maracaibo, Venezuela, as described in the *Electrical Review* of 9th May, 1952. When used in conjunction with a permanent drilling platform erected at each well site, it will be capable of drilling to depths of 3 miles and, as a self-sustaining unit, it will be able to operate for over 30 days without refuelling.

An unusual feature was that the barge was launched with practically all the main machinery on board and towed to Venezuela.

The vessel, designated G.P.2 (signifying *Gabarra de Perforacion*, which is Spanish for drilling barge), was built by Ferguson Brothers to a special design and will house the main diesel-electric power plant together with other major and ancillary equipment and materials associated with oilwell drilling as a self-sustaining power unit.

The barge measures 158ft by 80ft and has a draft of only 7ft 6in. After completing the fitting out of the barge and, at the same time, testing all machinery in operation, all the main machinery was to be specially sealed and preserved to ensure that it arrived in good condition after the tow of 5,000 miles to Venezuela by the Dutch tug *Rode Zee*.

Moving the Shell oil-drilling barge to a fitting-out basin after launching before its journey to Venezuela

PARLIAMENTARY NEWS

From Our Special Reporter

IN the House of Commons last week, Sir Herbert Williams asked the President of the Board of Trade if he would arrange to place in the library a copy of the "BEAMA Catalogue, 1952," in view of his official commendatory message which appeared as a preface to this effort to secure export trade.

Mr. Mackeson said he understood that a copy had been placed in the library.

Mr. Bottomley asked if, in view of the fact that the Minister thought that this was an excellent catalogue, he would consider drawing the attention of other industries to the way in which it was presented—in other words, the language of the country in which it was hoped to sell the goods.

Mr. Mackeson replied "Yes." He hoped that hon. Members on both sides of the House would look at the Catalogue. He would like to pay a tribute to his predecessor for his efforts to get this sort of publication issued in four or five languages.

B.B.C.'s Capital Expenditure

Mr. Gammans (Assistant Postmaster General) told Mr. Ellis Smith that the total capital investment authorized for all B.B.C. services was:—1949, £1·6 million; 1950, £1·7 million; 1951, £1·8 million; and 1952, £2·0 million. Television and sound broadcasting had never been separated for this purpose.

Dual-Purpose Poles

Mr. Vane asked the Assistant Postmaster General on how many occasions during the past year, when planning telephone lines, his Department had been able to make use of existing poles carrying electricity mains; and, when new development was under consideration, if he had been able to agree his draft scheme with that of the electricity authorities so that one set of poles had been able to carry both cables.

Mr. Gammans said that there had been 2,360 occasions involving 6,683 poles. In planning new pole routes there was full co-operation between the Post Office and the electricity supply authorities.

Exports to China

Mr. Mikardo asked the President of the Board of Trade whether he was aware that his Department was refusing to license the export to China of electrical generators and motors of all sizes; and, in view of the fact that generators and motors of low capacity had no military use and that their export to China was permitted by other Western countries, whether he would permit low capacity electrical equipment for normal civilian use to be exported.

Mr. Mackeson said that licences were being refused for the export of these goods to China because of their strategic importance. He did not agree that generators and motors of low capacity had no military use.

Owen Falls Scheme

Replying to Mr. Llywelyn Williams, the Secretary of State for the Colonies (Mr. Lyttelton) said that progress on the Owen Falls Hydro-Electric Scheme, Uganda, had been good. The concreting of the dam was now well under way and one generator should be working by December next year.

Yorkshire Board's P.R.O.

Sir Herbert Williams asked the Minister of Fuel and Power whether he would obtain information from the British Electricity Authority regarding the circumstances attending the dismissal by the Yorkshire Electricity Board of its public relations officer, in view of the fact that this man was principal witness for the Crown in the proceedings last year which were taken after questions had been asked in the House of Commons.

Mr. Geoffrey Lloyd said he would not. The public relations officer of the Y.E.B. was not in fact called as a witness in the proceedings taken in November, 1951, against the Board and others.

Scottish Hydro-Electric Board

Mr. Grimond called attention to the capital charges scheme of the North of Scotland Hydro-Electric Board. He thought that it would have been more in the spirit of its constitution and more in the interests of the Highland farmer, and would have made administration much easier, if the Board had obtained some Government assistance and had then raised the tariff slightly over the whole of its area.

Mr. Henderson Stewart, Joint Under Secretary, Scottish Office, said that the Board was given the duty originally of co-operating in measures for the economic and social improvement of the Highlands and Islands. It was becoming increasingly difficult for the Board to carry out that original intention. The cost of giving supplies in outlying areas was so high that the Board could not afford any longer to meet the whole of the loss involved. It was already meeting at least three-eighths of the loss. He did not think that the charges made were excessive.

Transmission Line Signalling

I.E.E. Supply Section Paper

IN his paper "The Uses of Earthed Signal Conductors on Transmission Circuits," presented before the Supply Section of the Institution of Electrical Engineers on 17th December, Mr. W. Casson (B.E.A.) makes the case that an insulated signal conductor on a transmission line, earthed at the ends, is a simple and reliable channel which can provide considerable gain both technically and economically in the field of communication, protection and fault recording.

He describes the uses to which an additional conductor can be put if it is tightly insulated at each support or embedded in insulation within the earth wire and earthed at both ends, and says it should be possible to increase the circuits within the channels without major modification.

Types of Channel

In describing the six types of channel in use: open wires, private pilot cables, hired pilots, radio, carrier current transmission through the main conductors, and carrier current through an earthed signal conductor, the author stresses the advantages of the last scheme over the penultimate method.

The wire would provide a path for a current at power frequency induced from the main conductors, and thus afford a simple form of feeder protection. Alternatively, the signal conductor could be held in insulation in an earth wire of the coaxial type, with the core earthed at the ends through wave traps. For a line up to about 40 miles long the cost of an open wire earthed signal line without transmitters and receivers would be less than that of providing the main conductor traps and injection equipment.

In designing a new line the main problem is to decide on the best disposition of the conductor in relation to the main conductors and the earth wire. If the conductor is for communication only it can be placed in any position that will ensure that it does not encroach on the statutory clearances to earth and the designed clearances to the other conductors. On a line with a single earth wire a suitable position would be centrally below the earth wire. If communication and protection and fault location are all required the position must be such as to give the desired fault settings.

If there are both overhead line and cable sections the signal conductor can be connected to a coaxial cable laid with the main cable sections.

A single conductor set-up with wave traps and filters is described, as is an experimental signal circuit on a 132 kV double circuit line from Bedford to Austin Canons grid substations.

The contention that it would be satisfactory to use single 11 kV insulators on 132 kV lines and double 11 kV insulators on 275 kV lines is supported by many formulæ. Further formulæ and illustrations are used in discussing such aspects as induced currents under load; simulation of the induced current in the signal conductor of a two-ended line on through currents; simulation of the induced current in the signal conductor of a two-ended line on internal faults; and effect of capacitance currents.

The use of the signal conductor for protection is dealt with in terms of directional comparison; balanced-current, teed-feeder, transformer feeder, and double circuit line schemes, and the use of the signal conductor to enable indication of the fault position to be determined are also discussed.

DISCUSSION

Opening the discussion Mr. L. Gosland (E.R.A.) said that a little more information about the economics of the system would have been welcome and it would be interesting to know whether additional wave traps would raise difficulty from the point of view of radiation. With regard to reliability, if these systems were insulated to stand the worst conditions they were very costly. If they were not insulated, they

were liable to fail at a critical moment. A realistic evaluation of the risks from lightning strokes on the earthed wire, taking the flash-over to the main conductors, when the signal conductor might be expected to flash over at the same moment would be useful in considering the merits of the author's proposals.

Mr. W. T. J. Atkins (B.E.A.) thought the paper stood or fell by the scheme for signalling rather than by the protective aspects. He was surprised that the author had given so much attention to the use of 100 kc/s, which was a conventional power-conductor carrier frequency. In signalling over an earthed wire of this kind it was endeavoured to compromise, avoiding trip to signal effect and keeping as low as possible. As narrow a band as possible was used, consistent with the amount of information to be conveyed. It would be important to know the result of the author's experiments in transmitting relatively low frequency signals.

Mr. C. Ryder (Metropolitan-Vickers) said that the author must be given credit for a novel arrangement but in such a matter there must either be considerable technical advantages at the same cost as for the orthodox equivalent or the same services must be performed at a much lower cost, or some combination of the two. He wondered whether Mr. Casson was too optimistic. The speaker thought that some lightning surge protection might be required at terminal points involving additional equipment and increased cost. With regard to the protective arrangements, he got the impression that the scheme would have to be " tailor-made " for each line. If so, there would be difficulties and complications at the outset. The author dismissed somewhat lightly the effect of a magnetizing surge. This was well above the setting of any protection that might be fitted, and some arrangement would be needed for smothering or counteracting it if the protective gear was to be stable, because the relay at the feeding end looked upon the situation as an internal fault.

Mr. M. Kaufmann (B.E.A.) said that a simple, cheap, auxiliary pilot circuit suitable for multi-channel signalling would be a great boon, and fault location would be an added attraction. There was good reason to believe that the author's circuit would find ready application on overhead circuits on distribution systems. He had some reservations, however, about its application to transmission systems so far as h.v. lines were concerned. Present indications were that it did not compare favourably in cost and convenience with alternative methods.

Mr. J. R. Harding (Pirelli-General Cable Works) expressed interest in the statement that one alternative to grid lines was to erect the signal conductor below the main conductors. He did not think the authorities would regard the arrangement with favour on 132 kV lines, however. The advantage of erecting below the main conductors was that it was cheaper and more accessible. There was improved lightning protection and some measure of extra provision against contact with cranes and so forth. He very much doubted whether it would be possible to install additional conductors by suspending them from the earth conductor on old lines, as suggested, though it might be done on new lines.

Mr. P. F. Gunning said that when all the problems were taken into consideration, the conclusion might be reached that a hired Post Office pilot was a cheaper method.

Mr. W. D. Goodman commented on the communications aspect of the paper and the author briefly replied.

STREET LIGHTING NOTES

COMPLAINTS about REDCAR's street lighting were made at a meeting of the Corporation Finance and General Purposes Committee. Councillor Atkinson said the poor lighting would continue until they changed over from gas to electricity. The borough engineer (Mr. R. Hilton) agreed that the lighting was not up to standard, but stated that conversion to electricity would cost £70,000.

As the first stage of its scheme for the electrification of street lighting SCARBOROUGH Town Council proposes to convert 12 large gas lamps. A saving of £2,000 per annum on present gas lighting charges is anticipated.

BRADFORD Corporation is applying for consent to borrow £2,273 for the installation of street lighting on the Brierley housing estate, Sections A and B, and £2,464 for similar work on the Buttershaw estate, Section B.

During the next eight years, the Aycliffe Development Corporation is expected to spend £16,000 on street lighting in the new town of NEWTON AYCLIFFE.

Gas street lighting is to be converted to electricity by WIGSTON (Leics) U.D.C. at a cost of £7,965. There will be 141 electric lamps.

POWER STATION CONTROL

Method of Communicating Orders

A NEW signalling system known as the "Telecommand" has recently been brought out by Standard Telephones & Cables, Ltd., for initiating stereotyped orders between power station control rooms, boiler houses and turbine rooms. As in all of the company's remote control systems use is made of telephone type apparatus and techniques.

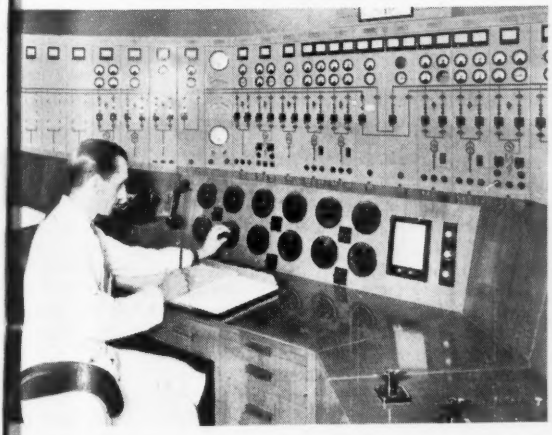
The system provides the control engineer with a means of selecting one from up to ten orders on which action is required in the boiler house or turbine room. The selection is made by means of a specially adapted rotary selector switch and initiated by depressing the switch knob after the order has been selected. For the receiving end a range of different types of receiver is available for mounting near the machine concerned.

The orders are announced at the receiving end by both flashing illuminated engraved windows and "Klaxon" hooters. The receiver is furnished with an acceptance button which when operated silences the alarm and causes the order to be steadily illuminated on an indicator panel. The sending switch in the control room contains a lamp which flashes in unison with the receiver until the acknowledgment or acceptance button is depressed on the receiver; the lamp in the sender switch knob then glows steadily in the same manner as the receiver, indicating the acceptance of the order.

The system can be supplied with two-way telephone facilities or with an emergency operation signal in the reverse direction. A 50 V d.c. supply required for operating the system is carried over multi-core 20 lb/mile telephone type cables.

Systems of this type are being supplied to the British Electricity Authority for installation in its power stations at Braehead, Northampton, Rye House, Fleetwood, Clyde's Mill and Doncaster. Overseas the system has been selected for use in the power stations at Connaught Bridge in Malaya, Los Peares in Spain, Owen Falls in Uganda, Machund in India, and for power plants for the Anglo-Iranian and Kuwait Oil Companies.

Left: **Section of the Rye House power station control desk showing sender switches for six turbines and six boilers.** *Right:* **Boiler-house pedestal-mounted six-way receiver with telephone**



Joint Consultation

Supply Industry Experience and Possibilities

By W. WALSH
A.C.I.S.

PART of the "machinery" established under the 1947 Electricity Act for the maintenance of good labour relations and to promote co-operation between those who manage and those who are managed is joint consultation. This is provided for by a three-tiered body consisting of the National Joint Advisory Council (N.J.A.C.); District Joint Advisory Councils (D.J.A.C.s) for each Area Board or Division; and Local Advisory Committees (L.A.C.s) at the local or district level.

The other part of the machinery, the various Joint Councils and Boards (and their satellites) care for the more "bread and butter" needs—the regulation of working conditions and hours of work and wages. But happiness in work, it was realized, depends not merely on full stomachs and contented leisure, but on less tangible things like good fellowship and understanding which cannot be promoted by agreement.

Thus the purpose behind joint consultation may, somewhat vaguely but nevertheless truly, be said to be the creation of confidence between workpeople and management, confidence which can spring only from the sharing of experience and common problems.

Sharing of experience must, naturally, be somewhat restricted; a local manager could not explain all his problems to all his employees, nor could he consider every idea put forward by every worker. In a broader sense while the Area Boards and Central Authority determine policy, the carrying out of policy requires the co-operation of all employees, but to consult them all would reduce management to chaos. Thus in order that employees' points of view may become better understood the joint consultative machinery was set up.

One of the drawbacks of this type of machinery arises from the very vagueness of its purpose and ideals. Local Advisory Committees are still often confused with the various Works and Staff Committees or the Electricity Consultative Councils. This may arise from inadequate publicity, nationally or locally, but equally it may be that too many committees and councils which sprang into being on nationalization have given employees mental indigestion. Moreover, the conception of industrial democracy through joint consultation was a new one and even after three years it is still not fully understood.

Yet the need for some form of democratic representation is beyond question, as the very growth of Board and Divisional organization is such that the individual worker feels lost in it. The feeling of remoteness creates indifference, happiness in work departs and with it the identification of the worker with his job and his efficiency. When the manager is not someone always on the spot, but some remote and distant figurehead, then it would seem that reality of identity in a common purpose can be achieved only when someone elected by individual workers can take a seat along with the managers and learn in committee what was learned at the work-bench, when the job was small and intimate. It is then (if practice is allied to theory) that the representative by diffusing his knowledge of what is being thought, studied and planned, secures the confidence of those he represents and ensures their co-operation through understanding.

Does it Work?

The need for some means of making the worker feel "one of the family" in the huge organizations which now exist is not in dispute. When units were smaller the need was not apparent because management was part of the men, the manager was a flesh and blood person who was seen daily, who was approachable easily and who did not have to consider the repercussions of his action in granting some unusual request or departing from the agreed procedure.

Now all this is changed, local managers do *not* have the freedom they used to possess, their ability to do this or that is not conditioned merely by the need to explain or consider their actions in relation to *local* people and, co-opted on various committees and with wider areas to manage and more complex organizational problems to solve, they cannot find time to mingle with the workers as they did before. Moreover they are not the only " managers " and workers rarely see the others.

Thus the need for " human relations " in the industry is beyond question, but whether the present method is the best is another matter. However right the machinery of joint consultation may be, a large majority of employees—including many who are actually on the advisory committees themselves—are apathetic towards the aims and ideals of the machinery. A large number are not interested in what is being done, a few cannot believe in the good intentions of the system and quite a fair number consider the whole thing a waste of time. How far this is true of the managerial side also is not known. Comment would indeed be welcome. The test is really this: Does joint consultation work in the majority of cases? If it does not an inquiry must be made why this is so, directed to the activities of both sides of the table.

Need for Publicity

If the implication that joint consultation is not working is true then there is no doubt that to make it work is worth striving for. One cannot expect miracles in three years; minds in the industry have not yet been conditioned to the ideas of joint consultation and to achieve that state much more publicity is needed. This should come from representatives on the committees themselves to a very large extent, but aid is needed in the way of human interest stories which illustrate what is being achieved by the consultative machinery. Circulation to local committee members of details of the practical work done by the more successful committees would help in showing how it is intended the machinery should work.

If it is practicable, some of those engaged in the higher spheres of management might find a little time to circulate among their fellow employees. Unofficial visits to workers on the job where it can be seen that visitors from the " stratosphere " are human and not afraid to shake an oily hand would aid in providing that identity of common interests which seems so necessary. It is reported that after one of the annual summer schools a worker attending expressed his appreciation by saying that he now felt himself to be somebody; a word or two of recognition on personal visits would increase that feeling much more quickly and economically than attendance at a summer school.

Attendance of Observers

The attendance of other than elected representatives—as observers—at Local Advisory Committee deliberations would help to publicize their work (bearing in mind that change in representation is infrequent) and even more the attendance of L.A.C. employee representatives at the D.J.A.C. and N.J.A.C. meetings might create enthusiasm. Again it may be possible that brief exchanges of employees, between District, Sub-Area and Area Board levels, would stimulate interest in management problems and their solution.

It is somewhat difficult for Advisory Committee representatives to appreciate why at D.J.A.C. and N.J.A.C. level workers should be represented by trade union officials. The body is not a negotiation council, it can only recommend, its recommendations do not affect wages or working conditions and however well-meaning or skilled trade union and Board representatives may be, it is difficult to understand how they can appreciate what safety, health and welfare measures, which are covered by the advisory machinery, are in the best interests of employees.

Were it not for cost considerations the best of all methods would be to hold informal talks in normal working hours on how the Board works, on the persistent problems of management and how the joint advisory machine is designed to give every worker an understanding of the contribution he can make to the success of the industry. It is not necessary that there should be more than one talk in working time and it might be that it could be combined with some other formal meeting (e.g., Civil Defence lectures) so that costs would be kept to the minimum. The practical point is how far such costs would make an expensive machine work at full pressure rather than half pressure as is suspected now.

Some of the contents of this article may

be provocative—but if provocation can arouse interest and banish apathy then the purpose of these notes is well served. The joint consultative machinery is inherently sound in idea but perhaps shaky in construction. In three years it has done some excellent work in extending existing safety, health and welfare measures to all sections of the Boards. It has introduced new ideas (summer schools, scholarships, training schemes, etc.), and in the more active local committees it has proved its worth in co-operation in the formulation of maintenance programmes, design of amalgamation schemes, etc. When it can be seen what a few can achieve it appears worth while to try to make these co-operative ideas commonplace rather than outstanding.

Electric Traction in Lancashire

Use of 50 c/s System on Lancaster–Morecambe–Heysham Line

THE railway line between Lancaster, Morecambe and Heysham has recently been re-electrified on the 50 c/s system of electric traction, and trial running for experimental purposes has begun. It is not expected, however, that service operation will commence until the New Year.

This line was first electrified in 1908 as an experiment to test the use for electric traction in this country of 25 c/s a.c. supplied to an overhead contact wire. Recent technical developments have opened up the possibility of satisfactory train equipment being designed for operation at the standard supply frequency of 50 c/s. As compared with d.c. traction systems, a.c. systems have the advantage that a higher contact wire voltage may be used.

The original trains of the Lancaster–Morecambe–Heysham line had to be withdrawn from service in February, 1951, owing to age. The overhead equipment, however, was in good condition and British Railways decided to convert the line for 50 c/s operation at the original voltage of 6·6 kV. A new substation fed from the North Western Electricity Board's network has been built at Green Ayre station, Lancaster, to supply electricity to the line, and it replaces the old motor generator substation at Heysham. Three existing 3-coach electric train units have been refitted and rectifiers for feeding d.c. motors installed in them. Nearly a mile of the original overhead equipment has been taken down and a variety of modern types of equipment installed in its place for trial.

This electrification is being carried out as a joint experiment in which British manufacturers of traction equipment are taking part. The English Electric Co. has provided the electrical equipment for the three trains and the B.I.C.C. group the experimental overhead equipment.

Experiments to investigate the many special problems peculiar to this system of traction, which is entirely new to this country, are to be carried out. When satisfactory results have been achieved, train services on the line will be operated electrically with the three experimental trains, and other types of equipment submitted to test.

Electric Fuses

A REVISED edition of B.S. 88, "Electric fuses for circuits of voltage ratings up to 660 V," has just been made available by the British Standards Institution, 24, Victoria Street, London, S.W.1, price 6s. It relates to fuses intended for all types of duty and current ratings, both 50 c/s a.c. and d.c.

The most important feature in this new edition is the introduction of an appendix dealing with the dimensions of cartridge fuse links to secure interchangeability. A number of other changes, some of a minor nature, have been made but the number of these changes is so great that it was considered desirable to reprint the whole specification rather than deal with the changes by an amendment sheet.

Five categories of duty are defined and temperature rise, fusing factor, performance and design are dealt with, tests being described in detail. Appendices give notes on terms used in the specification; on measurement of prospective current and cut-off current; computation of power-factor and time-constant from oscillograms; measurement of recovery-voltage and arc-voltage; and selection of fuses.

Patent Office Centenary

Exhibition Illustrating a Century of Technology

IT is just a hundred years since the Patent Office was opened at Southampton Buildings, Chancery Lane, London, as the sole office for granting patents for inventions. To mark the occasion a three-day exhibition of the work of the Patent Office was opened on 17th December by Sir John Blake, Comptroller-General of the Patent Office. The exhibition was held in the library, which was opened in 1855 and houses one of the finest collections of scientific and technical books in the world.

Early Inventions

The various exhibits were arranged to illustrate landmarks in the history of patent law and practice and some of the outstanding inventions for which patents have been granted. The technology of the century was illustrated by a selection of about a hundred patent specifications in the major industries granted during the period. Among them was that for the first diesel engine, a German invention which was patented here in 1892; there was also Parsons' application, dated 1844, for his turbine patent and Fleming's application in 1904 for a provisional patent for the thermionic valve. An aerial torpedo, a forerunner of the flying bombs of the last war, was patented in 1921 by the Sperry Gyroscope Co. of New York, and in 1931 Sir Frank Whittle's invention of jet propulsion was accepted.

Other specifications on view related to apparatus concerned with radar, atomic energy and nuclear fission. There was also a collection of patent specifications for curious inventions and some old letters patent and wax seals, among which was the oldest known patent: that for supplying stained glass to Eton College in the fifteenth century.

Up to the time that the present office was opened the granting of patents was a complicated affair involving visits to seven different offices, the preparation of many documents and the payment of fees totalling about £100 for a patent for England alone, or attendance at about sixteen offices and payment of over £300 for a United Kingdom patent. The application had to pass through ten separate stages at two of which the personal signature of the Sovereign was required.

The system was attacked in 1850 by Dickens in his story "A Poor Man's Tale of a Patent" and its reform was demanded by inventors, industrialists, engineers, lawyers and so forth. After much tribulation the Patent Law Amendment Act was passed in 1852. This reduced the initial fees for the United Kingdom to £25, but renewal fees of £50 and £100 became payable at the end of the third and seventh years. Difficulties soon arose, however, because the Commissioners all held other appointments and were unable to perform the duties allotted to them by the Act.

Transfer of Control

A new Act, passed in 1883, transferred responsibility for patents to the Board of Trade which set up the Patent Office as it is to-day, under the control of a Comptroller-General, the only connection with the former Commissioners being that the Law Officers of the Crown were made the appeal authority for the legal decisions of the Comptroller and were appointed to advise him in matters of law or procedure.

In 1901 a Committee, presided over by Sir Edward Fry and including Lord Alverstone, Sir Edward Carson, and Mr. J. Fletcher Moulton, recommended that the Patent Office should investigate the novelty of all inventions for which patents were sought. Effect was given to this recommendation by the Patent Act of 1902 which involved scrutiny of the accumulated documents of 50 years. When the work was brought up to date in 1907 some 375,000 patent records had been summarized.

Another Patents Act in 1907 extended the investigations as to novelty to include overlapping concurrent applications, thus accomplishing what had unsuccessfully been attempted under the 1883 Act and

abandoned in 1888, viz., the avoidance of granting patents for the same invention concurrently to different applicants without warning the parties.

Largely because of dispersal of staff, work began to fall behind at the end of the first war and by 1930 11,000 specifications were in arrear. These difficulties were intensified by the 1932 Act which widened the area of search to include publications of every kind in all languages, and by the second world war which resulted in the permanent oss of many scientifically trained staff. By 1947 the accumulation of specifications awaiting examination had reached nearly three times the previous peak figure of 1930. Additional staff has been recruited and trained in the past five years, however (the total is now nearly 1,000), and the number of outstanding specifications has been reduced to about 22,000.

During the years 1944–1947 the patent system was again reviewed by a Departmental Committee, under the chairmanship of Sir Kenneth Swan, O.B.E., Q.C. The Committee found that there was no indication of any general desire for fundamental change in the present system of encouraging and rewarding invention by the grant of patents and most of its recommendations have been implemented by the Patents Act, 1949, and Registered Designs Act, 1949.

The Patent Office and the Industrial Property Department of the Board of Trade now deal not only with the granting of patents but also with the registration of trade marks and designs, and with questions relating to literary and artistic copyright.

New Technical College

ON 16th December H.R.H. the Duke of Edinburgh officially opened the new Technical College of the Hertfordshire County Council at Hatfield.

On a 90 acre site, the building is liberally laid out with floor space for a large assembly hall and many classrooms, laboratories and workshops, with accommodation for about 25 students per classroom, etc. Some of the classrooms are set out for adult discussion work and student conference rooms. There is a well-equipped gymnasium, and the cultural and sports sides of college life are well catered for.

A feature of the building is the precast reinforced concrete members for the main structures which were adopted to overcome material shortages, and this is particularly notable in the assembly hall where the upright and part roof members constructed as a whole, each weighing 5 tons, were made on site and crane-handled into position.

Actually the college has been functioning since early September, and already there are, all told, about 1,400 students on the register. It is expected that this figure will rise to a total of from 4,000 to 5,000.

A key to the whole conception of the college is catering for the part-time student by arrangements with manufacturers and other employers for student time releases for "sandwich" course training. About half the existing students attend on this basis and this proportion is expected to be maintained as the number of students increases.

After a conducted tour of the college our impression was that the emphasis throughout was on the aeronautical sciences, but there are five main departments as follows:—Technical and design engineering; works and production engineering; building; commerce and retail trades; and social and professional studies.

The electrical engineering laboratory is well equipped with a selection of modern machines, such as a Schrage motor, a mercury-arc rectifier and a six-phase alternator, while in the light current laboratory there are many excellent examples of electronic and other precision instruments. There is, however, much interesting electrical equipment in the other laboratories and shops. For instance, in the aircraft structures and materials laboratory we saw an example of the elaborate scheme for the measurement of strains created by electric resistance heating. Tiny heating resistances are plastered on the work surface, and the expansions of the work sections are measured electrically on precision instruments.

E.H.V. CABLES FOR CANADA

Ontario and Quebec Installations

BY the end of this year Enfield Cables, Ltd., will have supplied and supervised the laying of $1·5 million worth of e.h.v. cables for leading supply authorities in Eastern Canada. Three contracts are involved, the first being for the Hydro-Electric Power Commission of Ontario for whom the company has laid about 5,750ft between the Don Fleet Junction and the Toronto Esplanade Terminal Station in the City of Toronto. In successful operation since late 1951, this 115 kV pipeline compression cable, with a 91/·1048in conductor, was laid under extremely difficult conditions. At one period the level of Lake Ontario rose by 3ft and floated the pipelines in their trenches.

A second Enfield e.h.v. cable, for the Quebec Hydro-Electric Commission of Montreal, has been under load since last spring. St. Helens Island, Quebec, is linked with the south shore of the mainland by a 120 kV three-phase circuit across the steel-framed Jacques Cartier Bridge, over the River St. Lawrence which is 1½ miles wide at this point. Four single-core self-contained compression cables, one being for a spare phase, have been laid 16,000ft in route length over the land section (conductor size 91/·0966in) and 900ft in route length over the bridge where the conductor size is reduced to 61/·1032in.

The Hydro-Electric Power Commission of Ontario has placed a further order for an identical type of compression cable 4,600ft in route length between Mill Street Junction and the Gerrard transformer station, Toronto, the installation of which will be completed by the end of the year. These contracts have been secured in the face of intense competition from several manufacturers in North America.

Compression cable pipes weighted down with sand to prevent floating

NEXT WEEK'S EVENTS

Monday, 29th December

LEEDS.—Leeds University, 7.30 p.m. Incorporated Plant Engineers, West & East Yorks Branch. Ladies' evening.

Tuesday, 30th December

WOLVERHAMPTON.—Star and Garter Royal Hotel, 7 p.m. Institution of Works Managers, Wolverhampton Branch. "Management Problems" Brains Trust.

Thursday, 1st January

EXETER.—Providence Hall, Northernhay Street, 7 p.m. I.E.S. Exeter Group. Discussion on Home Lighting.

LONDON.—At the Royal Society of Arts, John Adam St., Adelphi, 6 p.m. Institution of Engineering Inspection. "Standardization and Inspection," by E. G. Brisch.

Thursday, 1st January and Friday, 2nd January

LONDON.—Savoy Place, W.C.2, 3 p.m. Institution of Electrical Engineers. Christmas lecture for older school-children. "Sound Broadcasting," by Dr. K. R. Sturley.

Friday, 2nd January

BIRMINGHAM.—College of Technology, Suffolk Street. I.E.S. Birmingham Centre. Exhibition of new lighting equipment.

Imperial Hotel, 7.30 p.m. Incorporated Plant Engineers Birmingham Branch. "Metal Spraying for Protection," by W. E. Ballard. "The Reclamation of Worn Parts by Metal Spraying," by R. Wallwork.

BRISTOL.—S.W.E.B. Lecture Theatre, Colston Avenue, 5.30 p.m. I.E.S. Bath and Bristol Centre. Discussion on Home Lighting.

LONDON.—At the Royal Society of Arts, John Adam Street, Adelphi, 7 p.m. Institution of Electronics. "Underwater Television," by W. R. Stamp.

Storey's Gate, St. James's Park, 5.30 p.m. Institution of Mechanical Engineers. "Principles and Practice Governing Interchangeability and the Specification of Manufacturing Limits of Size as Influenced by Statistical Considerations," by Capt. G. C. Adams.

The Prince of Wales, Great Queen Street, 12.30 p.m. for 1 p.m. Engineer Buyers & Representatives Association. Informal luncheon.

Townsend House, Greycoat Place, 7 p.m. Junior Institution of Engineers. Film evening, "Packaged Power," introduced by H. M. Louch.

Saturday, 3rd January

BIRMINGHAM.—Grand Hotel, 3 p.m. Birmingham Electric Club. Children's party.

Power for Australian Farmers

The Example of New South Wales

By PETER DAVISON

AUSTRALIA'S widely scattered rural population, and a lack of major waterways for hydro-generation of electric power, have made the ideal of "all-electric" farms in Australia difficult to achieve. But, by various ways, Australia is gradually providing the farmer with electric power to light his home and drive his machinery.

In most of the six States of Australia the task of generating power is shared by the State Governments and private concerns. Sale of electricity is confined fairly generally within each State's boundaries. Because of this each State is carrying out its own rural electrification scheme and consequently some States have advanced further than others in providing electric power for rural areas.

Except in the southern island State of Tasmania, where a large number of fast-flowing rivers has made extensive hydro-generation of electricity possible, there are very few rivers on the mainland which are suitable for hydro-electric schemes. In New South Wales only about 7 per cent of the total electricity generated comes from this source. This figure will increase when the huge Snowy Mountains hydro-electric scheme, in the Southern Alps, is completed. The snow-fed waters of the Snowy River, instead of flowing into the sea on the southern coast of Australia, are being diverted and will flow west through more than 80 miles of tunnels driven through a mountain range, finally emptying out into the Murray Valley and then flowing further north into the Murrumbidgee River. Besides irrigating the Murray Valley, during its flow through the complicated network of tunnels, the huge volume of water will drive underground power station turbines.

A less ambitious, but no less important scheme, is under way in the southern State of Victoria. There the Kiewa River is being dammed and its waters will be used for the generation of electricity to supply the city and rural areas.

Already in New South Wales, over 43 per cent of the State's 70,000-odd farms are electrified and 70 per cent will have been connected by 1962. To do this a body was set up by the State Government to co-ordinate and administer the huge task of rural electrification. When the Authority started in 1945 only 16,000 farms in the more closely settled areas near the large cities on the coast had a supply of electricity. To-day that figure has more than doubled.

The Electricity Authority of New South Wales, as it is known officially, is concerned only with the pre-planning and directing of operations. The generation of electricity is controlled by the Electricity Commission of New South Wales which also erects the main transmission lines to serve the shires and counties to be connected. Distribution and connecting farms to the power lines is the job of the 141 local electricity supply authorities within the shires and counties scattered throughout the State.

About 90 per cent of the electric power supplying all parts of New South Wales is generated by the power stations controlled by the Electricity Commission. The Commission's main stations are at Sydney, Newcastle and Port Kembla. These stations, together with a number of subsidiary plants throughout the State, feed their output into what is known as the main interconnected system, a large power network which extends from Lismore in the far north coast district, to Wagga and Leeton in the southern area of the State, and out to Dubbo and Forbes in the central west. Through this network the resources of the State's power stations are pooled to provide a reservoir of electricity to feed power into the city and rural areas of New South Wales. Of the 818,382 electricity

Bongong
sch

A general view of the Kiewa Valley, New South Wales

Bongong Village in the Australian Alps—a settlement built for workers on the Kiewa hydro-electric scheme. It stands above Lake Guy, formed by the first completed dam of the scheme

consumers in the State, 756,026 are supplied by the interconnected system.

Besides the main network, there are several smaller systems, mainly in country towns, which supply very limited areas with street and domestic lighting. These are being absorbed into the main network as work progresses. Capacity of the interconnected system is 887,106 kW; there are 48 other private undertakings, with a combined capacity of 35,938 kW, making a grand total for the State of 941,044 kW.

The major power stations feeding the interconnected system from Sydney are all fired by coal which is brought from coalfields over 100 miles away. The trend now is to build power stations closer to the source of fuel, and work has begun on three major power stations—Lake Macquarie, Tallawarra and Wallerawang—all of which are on N.S.W. coalfields.

Most of the rural areas in the eastern portion of the State are supplied with electricity. In the remoter districts, such at the far western areas, power is generated by small oil driven plants. Although there is a fairly large number of these they supply only about 2 per cent of the total electricity requirements of New South Wales. As the main transmission network extends these plants will be closed down.

The number of farms connected in New South Wales does not include other rural consumers being supplied with electricity at the same time, such as stores, churches, public halls, and street lighting for townships and villages. About £A1,000,000 is being spent annually on extensions to these rural areas.

American Comparison

An interesting comparison with New South Wales' figures can be made with figures from the United States of America. Farm electrification in the United States rose from 30 per cent in 1939 to over 90 per cent in 1951. When the rural electrification plan is completed New South Wales will not be far behind the United States in the proportion of farms supplied with electricity. At present work is being concentrated in the more populous areas so that the greatest number will benefit in the shortest time. When these have all been connected, work on electrifying the balance of the State's farms will be considered.

One of the main difficulties which confronts the planners of rural electrification in Australia is the great distances separating farms. In the more isolated areas quite often there is an average of only one farm to each mile of line, which makes electrification expensive. Dubbo, 280 miles from Sydney, in the central west of New South Wales, is a typical example. The total number of consumers in the Dubbo rural supply area is 208, of which 133 are farms. The total cost of the extension and individual connections was £A59,565, an average cost of £A285 per consumer. The cost varies of course, according to the area and the number of consumers. At Jerilderie, on the Billabong Creek, 425 miles south west of Sydney, out of 55 consumers, 40 were farms, and the total cost was £A27,415. The average cost per consumer was £A467.

These figures are high. But it is considered that the advantages and comfort that electricity brings to the farmer offsets the initial cost. There are more than 100 uses to which electricity can be applied on the farm. Apart from the comfort and convenience it provides in the home, such as lighting, power for washing machines, hot water services, refrigerators and other household appliances, electricity offers increased efficiency, higher productivity and lower overhead costs.

Varied Applications

Besides the so-called luxury items in the home, the all-electric farm uses electricity for irrigation, chaff and silage cutters, grain elevators, maize huskers and shellers, seed cleaners, feed grinders, grass and grain dryers, hoists, root choppers, dairy machinery, sheep shearing machines, branding irons, lawn mowers, soil sterilizers, soil heaters, insect traps, glasshouse lighting, fruit graders, washers and sorters, insect sprayers, poultry equipment, and an almost limitless number of tasks which previously were largely carried out by manual labour.

The value of the radio to the farmer cannot be overlooked either. The Australian Broadcasting Commission disseminates regular programmes by agricultural experts. These have been proved to be of great benefit to the farmer in educating him and explaining ways in which farm production can be increased. Commercial radio stations (which earn their revenue by accepting advertisements) throughout Australia also conduct "country hour" sessions.

Commerce and Industry

Plant Maintenance Productivity Team's Report

Festive Window Displays

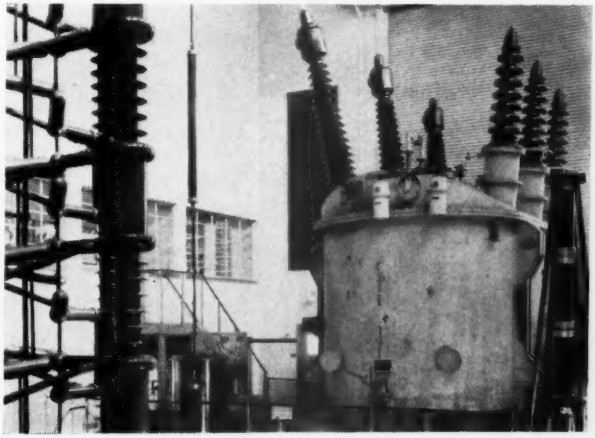
THE British Productivity Council (formerly Anglo-American Council on Productivity: U.K. Section) has published a report of the specialist team on "Plant Maintenance" which visited the United States at the beginning of 1952 under the auspices of the Council and the sponsorship of the Economic Co-operation Administration (now Mutual Security Agency). Copies can be obtained from the Council, 21, Tothill Street, London, S.W.1 (price 2s 6d). In effect, the team presents a comprehensive code of maintenance, based on both United Kingdom and United States experience and designed to be equally applicable in either country.

The report opens with a critical summary, primarily addressed to management, with the object of stimulating interest in subsequent chapters. The leader was Mr. J. B. Stevenson, works director, E.M.I. Factories, Ltd., and the members made a 4,000-mile tour through the eastern States, visiting some 16 plants. They also attended the Third Plant Maintenance Show and Conference at Philadelphia.

A particular purpose of the visit was to study technical administrative methods rather than the engineering details of plant maintenance.

Transformer for 275 kV Grid

A few days ago a 120 MVA three-phase auto-connected transformer with a voltage ratio of 275/132 kV was completed in the Stafford works of the English Electric Co., Ltd. This is the highest voltage for which power transformers have yet been made in this country and the impulse test is said to have been at a higher level than has ever been applied to a British transformer. The peak voltages reached during the tests were 1,050 kV for the full wave and 1,200 kV for the chopped wave. The unit is to be despatched for service on the first section of the 275 kV grid of the British Electricity Authority. The core and windings will be transported in the tank without oil, the weight being 87 tons.



English Electric 120 MVA 275/132 kV transformer

Power Farming Conference

The third National Power Farming Conference is to be held at Cheltenham Town Hall on 10th, 11th and 12th February next, under the auspices of *Power Farmer*. Papers already arranged include the following: "Making Machinery Pay on the Small Farm," by Frank Henderson; "Grass Drying: Field Management and Storage," by A. S. Christensen; "Machine Design," by David Ransome; "Recent Developments in Grain Drying," by H. T. Horsman; and "Maintenance and Housing of Machinery," by N. H. Steele. The programme has been planned with the object of bringing out cases in which there may be uneconomic expenditure on the one hand, and methods of raising output on the other. There will be a civic reception and dance given by the Mayor of Cheltenham on the opening night and the Conference dinner will be held on the last night. There will be no charge for admission to the sessions but those intending to be present should send in their applications

well in advance of the Conference date. Inquiries should be sent direct to the Organizer, *Power Farmer*, Dorset House, Stamford Street, London, S.E.1.

Whitaker's Almanack

The Coronation Year edition of "Whitaker's Almanack," now available, is the largest so far published (1,174 pages). As usual, it is a reference library in itself, covering a very wide range of subjects. Among the improvements is a new list of trade unions affiliated to the T.U.C. and details of employers' organizations. A special section on broadcasting has been added which gives, *inter alia*, a selected list of Commonwealth and foreign radio stations with outputs and wavelengths.

The Almanack is published by J. Whitaker & Sons, Ltd., 13, Bedford Square, London, W.C.1, in three forms: the complete edition (cloth boards) at 15s; the shorter edition (676 pp., paper bound, at 7s 6d; and the library edition (leather bound, with coloured maps) at 30s.

Circus Lighting

This is the time of year when the thrills of the circus have a special appeal for both young and old. Good illumination of the ring is essential to the full enjoyment of the show and the accompanying picture shows one of the Bertram Mills "turns" in the middle of a performance. The lighting is provided by two clusters of Benjamin deep dome dispersive reflectors, each cluster having six fittings. This circus moves around the country staying only two or three days at each place. It is necessary therefore that all equipment should be designed for easy erection and dismantling. The Benjamin "Saaflux" reflectors allow the complete reflectors to be detached, leaving only the flange in position, and do not involve any disconnection of wiring.

Benjamin reflectors are used for lighting the ring of the Bertram Mills circus

Zinc Trading Freed

The Ministry of Materials has completed discussions with the trade on arrangements for the release of zinc from its stocks during the first seven months of private trading after 1st January. The Ministry has agreed to sell back to the agents of the United Kingdom and other Commonwealth producers 24,000 tons of zinc of their own brands. This metal will be available for immediate delivery as required throughout the first half of next year. Adequate supplies will therefore be available to meet consumers' requirements. No other zinc from the Ministry's stock will be placed on the market during this period, except for sales by the Government Broker on the London Metal Exchange for prompt delivery when no other prompt supplies are available.

Hoover High Wycombe Factory

A building programme which has increased the original 40,000 sq ft of floor space to some 62,000 sq ft is nearing completion at the works of Hoover, Ltd., High Wycombe, Bucks. This factory is not only the manufacturing centre for Hoover plastic commutators and switches, but also for most of the 4,000 service spare parts items for cleaners. The increase in floor space has enabled the spare parts stores to be transferred there from Park Royal, London. Advantage has been taken of the move to install the latest store keeping methods, using mobile bins to save space, and new clerical systems.

British Plastics Exhibition

The opening of the second British Plastics Exhibition and Convention, at Olympia, London, originally fixed for 3rd June, 1953, has been postponed to 8th June, and it will run until 18th June. The organizers (*British Plastics*, Associated Iliffe Press, Dorset House, Stamford Street, London, S.E.1) state that all space on the first floor of the Exhibition has been taken and only a few sites on the ground floor remain vacant.

The Convention, running concurrently with the Exhibition,

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(1) "Creda" Christmas gifts in the window of London & Provincial Wholesalers, Ltd., Tottenham Court Road. (2) A variety of electrical presents in a window display of the General Electric Co., Ltd., Magnet House, Kingsway, W.C.2. (3) A revolving roundabout using decorative lamps in the B.T.H. display at Crown House, Aldwych. (4) The Hurseal showrooms in Regent Street, in which Eskimo figures add a whimsical touch to the display

will cover all the most recent important developments in plastics technology and application. There will be papers describing developments in cable and other covered conductors and the application of vacuum metal coating to plastics for electrical purposes. Progress in plastics materials will be described in papers dealing with melamines, silicones and polyamides, and a special session will be devoted to unplasticized p.v.c.

Christmas Window Displays

Electrical Christmas gifts afford excellent opportunities for attractive window displays, and in the pictures above we show a few examples of the many displays which have been arranged in London during the Christmas season.

Protected Indian Industries

It is reported by *Indian Trade and Industry* that the Indian Government has accepted a recommendation of the Tariff Commission that the protection of the Indian motor-vehicle battery industry shall be continued until 31st December, 1955, at reduced rates of duty.

The same official journal gives a list of Indian industries which were enjoying tariff protection at the end of September. This list includes (in addition to motor-vehicle battery manufacture) dry batteries, brass electric lampholders, electric motors and plastics (electrical accessories).

Trade Announcements

On 31st December the **Agro Electrical Co., Ltd.**, is removing its London office to National House, 60-66, Wardour Street, London, W.1 (telephone : Gerrard 0721).

The address of **H. G. Poxon Engineering Co.**, is now 1, 3 & 5, Northolt Road, Harrow (telephone : Byron 5120).

Elliott Bros. Birmingham Branch

Elliott Brothers (London), Ltd., have transferred their Birmingham branch office to larger and more modern premises at 181, Corporation Street, Birmingham, 4 (telephone: Central 8313). The new premises, which occupy two floors, provide showroom facilities with a window facing the main thoroughfare, ample office accommodation and workshop space for the service department. This new branch office is

New Birmingham Branch of Elliott Brothers (London), Ltd.

now the area sales, service and instrument repair centre for the Midland counties including Warwickshire, Worcestershire, Staffordshire, Shropshire, Northants and Leicestershire. The company's process control interests are in the hands of Mr. A. H. Robinson and Mr. H. F. Johnson, while Mr. G. F. Thomas specializes in electrical measuring instruments.

Structural Steelwork

Braithwaite & Co., Engineers, Ltd., have sent us a handsomely produced volume bound in cloth board containing numerous illustrations of the fabrication and erection of steel bridgework and structural steelwork of all types carried out by the company both at home and abroad. These include steelwork construction at a number of power stations, office buildings and factories.

Catalogues and Lists

Courtney Pope (Electrical), Ltd., Amhurst Park Works, Tottenham, London, N.16.—Illustrated folder dealing with lighting fittings for use with "Frenger" heated ceiling.

Metway Electrical Industries, Ltd., King Street, Brighton, 1.—Abridged price list of "New Era" conduit fittings and accessories.

Negretti & Zambra, Ltd., 122, Regent Street, London, W.1.—112-page illustrated catalogue on automatic controllers including reference tables (R.30).

Ega Electric, Ltd., Holyhead Road, Wednesbury, Staffs.—Comprehensive price list of "Ega" products including conduit fittings and accessories, stocks and dies, distribution boards, etc.

Stabilag Co., Ltd., 1, Broad Street Buildings, Liverpool Street, London, E.C.2.—Illustrated brochure relating to infra-red plant heating by "Stabilag" jackets.

Johnson, Matthey & Co., Ltd., 78/83, Hatton Garden, London, E.C.1.—"Electric Resistance Material"—a 28-page technical booklet, with tolerance tables (1440).

Lumitron, Ltd., 180, Shaftesbury Avenue, London, W.C.2.—36-page priced booklet illustrating the range of "Lumitron" lighting and fluorescent fittings.

Frank Whitelegg, 11, Regent Parade, Sutton, Surrey.—Folder illustrating wire-winding and wire-working machinery (GNE).

Edison Swan Electric Co., Ltd., 155, Charing Cross Road, London, W.C.2.—Priced leaflet illustrating the Ediswan "Clix" moulded ceiling rose plate.

Industrial Guarding Equipment, Ltd., Mill Works, Alvechurch, Birmingham.—24-page booklet providing a quick reference to standard guarding and safety equipment for industry.

Foster Transformers, Ltd., South Wimbledon, London, S.W.19.—Technical folder illustrating the principal products of the company (FM.12).

Thorn Electrical Industries, Ltd., 105-109, Judd Street, London, W.C.1.—"Atlas" leaflet AL/52D showing prices of a range of lamps and fluorescent tubes.

Automatic Telephone & Electric Co., Ltd., Strowger Works, Liverpool, 7.—Technical folder illustrating the "Rythmatic" Type 46 street lighting control switch (1227/1).

Geo. Becker, Ltd., Ampere Works, Wembley Park, Middlesex.—Illustrated catalogue of Bakelite accessories.

Information Department

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"Reliance" floodlights.
"Horn" extractor fans.

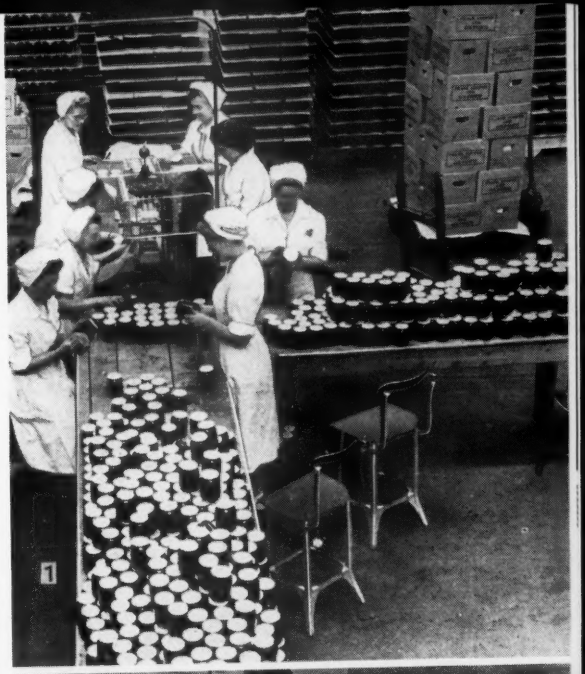
General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

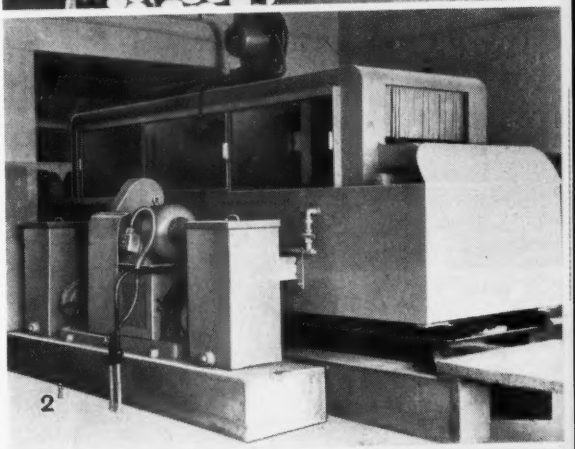
Unusual Conversion

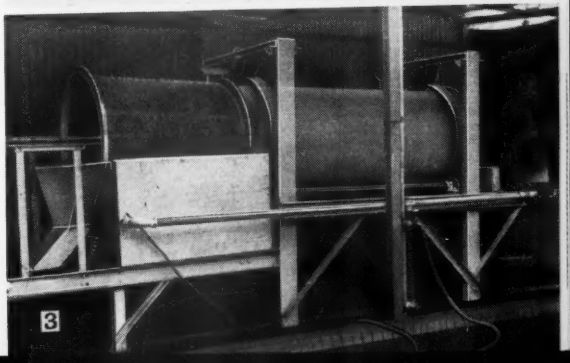
Ice Rink to Preserves Factory

THE successive change-over from ice rink and dance hall to cinema, a rest centre and hostel during the war and now a factory for the manufacture of jam and horseradish cream renders new premises acquired by Frank Cooper, Ltd., at Oxford of more than usual historic as well as electrical interest. The installation is particularly noteworthy both on account of the lighting problems involved in conversion and also for the considerable amount of electrically operated machinery peculiar to the preserves industry.

In the preparation of the fruit, apart from several Collis "MotaVeyors" employed for inspection, etc., many special purpose machines (mostly made by Brierly, Collier & Hartley, Ltd.) are utilized such as cutters, pulpers, black currant stringers, gooseberry snibbers, etc. The jam, cooked by steam, is poured by hand into the jars or cans which are then carried by an electrically operated conveyor through a steam heated sterilizer to semi-automatic cappers or can sealers with a capacity of 60 to 100 jars per minute. Labelling is done in







(1) Jars are labelled at a rate of thirty a minute on this semi-automatic machine. (2) Dawson 15,000 a day bottle washing machine. (3) This machine has been specially developed for the washing of horseradish

a separate section on Purdy semi-automatic machines handling thirty jars a minute. All the machines referred to are driven by either 1 or 2 h.p. three-phase motors.

Horseradish is first washed in a rotary root washing machine specially constructed by British Wedge Wire, Ltd., and driven by means of a 2 h.p. motor. Girls then scrape the washed roots and place them on a "MotaVeyor," a Woods exhaust fan ($\frac{1}{4}$ h.p. motor) carrying off the fumes. A Swift & Swallow combination cutter ($2\frac{1}{2}$ h.p. motor) has been specially adapted to cut and grind the roots which with other ingredients go to two "Fyna" mixers operated by 1 h.p. three-phase motors.

The resulting sauce is treated in a gas heated pasteurizer equipped with an electrically operated agitator and then passed through a homogenizer and cooler.

Three groups of Albro fillers and Flower labellers each deal with about 90 bottles per minute. A Vickers stitching machine ($\frac{1}{4}$ h.p.) is used for making cartons in the packing department.

Two bottle washers serve both jam and horseradish departments. One is a Millar Hydro machine with a capacity of about 12,000 a day arranged for loading and unloading at the same end. This machine incorporates three motors of $\frac{3}{4}$, 1 and 3 h.p. The other machine, a Dawson unit which has only just been put into service, has a capacity of up to 15,000 a day and embodies 1 h.p. and 6 h.p. motors. An automatic float controlled electrically operated effluent pump for the large amount of water used in washing processes is in course of installation to replace a petrol pump.

Heating of the factory is carried out by fan heater units, steam heated but operated by 1 h.p. electric motors. M.E.M. "Startet" starter units are fitted to all these heaters. All three boilers (one Ruston and two Cochran) are laid out for automatic stoking, while alternative water feed facilities are provided by Weir steam and electric pumps, the latter's 6 h.p. motor being automatically controlled by a Ronald Trist pressure switch. The original ventilation system for the building has been retained and supplemented, where thought desirable, by a Woods of Colchester extract system.

The lighting of the main factory with its lofty barrel vault ceiling presented some difficulties both in fixing the fittings and keeping them clean, the nature of processes undertaken making it inevitable that a large amount of dust will collect. The problem has been solved by the use of G.E.C. reflector fittings (with 500 W tungsten lamps) simply resting on angle iron rims suspended from joists which form the roof. These fittings, of which there are thirty-six, are not glazed but

(4) Combined cutting and grinding machine used in the preparation of horseradish; (5) One of the group of machines for filling and labelling jars of horseradish cream

have a thin wire mesh as a safeguard against the lamps falling out. They are connected by plugs to socket outlets and are readily removed for cleaning and maintenance. "RLM" reflectors also illuminate the horseradish department, fluorescent lighting (twin 5ft tubes) being used over the horseradish scraping benches and in the entrance. White plastic reflector fittings have been chosen for the offices. Other features of the electrical installation include G.E.C. bells, a Shipton automatic telephone and loudspeaker system, and a Bendix washing machine in the kitchen.

In carrying out the conversion Fred. G. Alden, Ltd., electrical, heating and ventilating engineers, were not able to make use of any of the electrical equipment already installed, apart from switchgear. They are now engaged on a scheme for providing Standard Telephones & Cables capacitors to improve the power factor.

Electricity in East Africa

Difficulty in Keeping Pace with Demand

THE increase in the use of electricity in East Africa is such that the East African Power and Lighting Co., Ltd., and its subsidiaries are finding it difficult to keep pace with the demand, and their difficulties are aggravated by delays in delivery of new generating plant. Some of these problems were dealt with by Major C. M. Taylor, chairman of the company, in his address at the annual meeting held recently in Nairobi.

New Plant Behind Schedule

Major Taylor said that two 2,500 kW gas turbines for Nairobi should have been in operation in January and August last respectively, but the first was not now likely to be in service before August next year. The two 2,500 kW water turbines for the Wanjii scheme should be available early in 1953. At the Tana power station delivery of the complementary 2,400 kW set had been delayed and could not now be in operation much before the middle of 1953. It was considered at the time of the last annual meeting that all the foregoing plant would be available about the middle of 1952. To meet the situation an oil engine set of 1,700 kW ordered for Dar-es-Salaam, for which station an early replacement had become available, was to be installed for operation early in 1953.

Among new projects was the Low Tana hydro-electric scheme for which a contract for 8,000 kW had recently been concluded. At the end of 1951 a start was made by the company's engineers on extensive ground surveys to supplement the aerial work previously carried out on the Seven Forks project. This scheme should yield some 80,000 kW under normal operating conditions. Further orders for oil engine plant had been placed to supplement the hydro-electric stations during the construction period of the Seven Forks scheme.

Mombasa was fully supplied during the year and the new stations at Nakuru and Eldoret, and extensions at Kisumu, were now in operation. In Tanganyika territory, a 5,000 kW extension had been held up by delays in delivery of hydro-electric plant while bulk supply to Mombasa from the Pangani Falls station had had to be curtailed owing to the increasing local demand. In Dar-es-Salaam and Moshi, demand had outstripped plant capacity, but two 1,000 kW oil engine sets had eased the situation, and a third set of 2,000 kW was in course of erection.

Increased Sales

The sales of the company and its subsidiaries totalled 134·5 million kWh in 1951, as compared with 109 million kWh in 1950. Local disturbances in Kenya had not had an adverse effect upon the business, but steps had been taken to guard the properties in the affected areas.

St. Dunstan's

THE thirty-seventh annual report of St. Dunstan's once again shows the manifold ways in which service men who have been blinded in the two world wars have been helped to conquer their blindness. It illustrates some of the many industries in which these men are now proving efficient workers and also some of St. Dunstan's welfare activities.

ELECTRICITY SUPPLY

"All-Electric" Houses at Wakefield

Higher Output in November

BECAUSE Wakefield City Council has so far had only electricity installed in new houses on the Kettlewell estate the North Eastern Gas Consultative Council recently decided to appoint a deputation to discuss the question of freedom of choice with the City Council. Ultimately 2,000 houses are likely to be built on the estate. A member of the gas body said he understood that 60 per cent of consumers preferred gas for cooking; it would be a serious matter if there were not freedom of choice in fuels. On the other hand, a *Yorkshire Evening News* reporter who visited the estate found that the housewives living in the first 20 houses to be let were "all well satisfied with their new all-electric homes." They agreed that electricity was cleaner and though some wondered what the cost would be others said that they had already found electricity cheaper than gas.

Future of the Highlands

The little fishing and crofting village of Lochinver, on the west coast of Sutherland, had a gala day on 11th December, when an electricity supply was switched on.

Mr. C. J. Grant, convener of Sutherland, remarked that the North of Scotland Hydro-Electric Board was doing more than any other body for the development of the Highlands. It would be a tragedy if the rumour that the Board was in danger of losing its autonomy were to be proved true. Once the Board ceased to be a separate entity, then all the schemes that were planned for the rehabilitation of the northern counties would be in jeopardy.

Mr. Neil S. Beaton, a member of the Board, announced that a start would be made with the proposed £8,000,000 Loch Shin hydro-electric scheme some time next year. There were now 13,680 consumers in Sutherland, Caithness, and Ross and Cromarty, and the Board was adding to that number a hundred new consumers every month. The work now in hand would bring the total to 16,350. He was sure the Board would succeed in its aim to bring back the people to the Highlands.

Generation in November

The highest percentage gain in electricity generated in any month this year was recorded in November, when the total (5,982 million kWh) was 9 per cent more than in the corresponding month of 1951. Up to the end of November the British Electricity Authority, the North of Scotland Hydro-Electric Board and the Lochaber Power Co. had generated 54,829 million kWh against 54,209 million kWh in the first eleven months of the preceding year, an increase of 3 per cent although less fuel was consumed.

As shown in Table I, the aggregate installed capacity at 30th November was 17,250 MW; this was 172 MW more than shown in the previous month's return of the Ministry of Fuel and Power. New plant installed in B.E.A. power stations included the following:—Brunswick Wharf: 320,000 lb/hr Clarke, Chapman boiler. Nechells: 52·5 MW Parsons set. Northampton: 175,000 lb/hr Simon Carves boiler. Keadby: 60 MW Parsons set and 550,000 lb/hr Babcock & Wilcox boiler.

TABLE I—ELECTRICITY GENERATED AND PLANT INSTALLED

	Fuel consumed Thousand tons		kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Oil	Steam	Water power	Total*		
British Electricity Authority ..	3,265	5·3	5,765	47	5,822	5,487	16,607
North of Scotland	15	1·1	23	133	160	159	643
Total for November, 1952 ..	3,280	6·4	5,788	180	5,982	5,646	17,250
Corresponding total for November, 1951	3,099	6·4	5,309	166	5,489	5,181	15,777
Increase or decrease, per cent ..	+5·8	—	+9·0	+8·4	+9·0	+9·0	+9·3
Total for year to date (11 months)..	30,825	61·0	54,179	1,511	55,829	52,607	
Total for corresponding months of 1951	31,017	77·2	52,754	1,297	54,209	51,143	
Increase or decrease, per cent ..	−0·6	−21·0	+2·7	+16·5	+3·0	+2·9	

* The total includes 10·4 million kWh generated by oil engines and 4·3 million kWh by was te heat plants in November 1952

TABLE II—ELECTRICITY SENT OUT BY AREA BOARDS FOR THEIR CONSUMERS

Area Board	Totals for November			Cumulative totals for eight months April-November			Totals for 12 months ended 30th November		
	1951 Mill. kWh	1952 Mill. kWh	Inc. or Dec. %	1951 Mill. kWh	1952 Mill. kWh	Inc. or Dec. %	1951 Mill. kWh	1952 Mill. kWh	Inc. or Dec. %
London	492·0	546·6	+ 11·1	3,124·6	3,160·9	+ 1·2	5,306·2	5,334·9	+ 0·5
South Eastern	272·3	313·1	+ 15·0	1,794·5	1,867·6	+ 4·1	2,978·1	3,088·1	+ 3·7
Southern	317·4	362·7	+ 14·3	2,060·8	2,198·5	+ 6·7	3,372·4	3,587·9	+ 6·4
South Western	151·2	172·3	+ 14·0	1,024·1	1,068·7	+ 4·4	1,685·2	1,732·7	+ 2·8
Eastern	441·7	507·6	+ 14·9	2,955·6	3,065·9	+ 3·7	4,864·5	5,011·4	+ 3·0
East Midlands*	383·4	422·6	+ 10·2	2,623·4	2,676·6	+ 2·0	4,207·1	4,292·6	+ 2·0
Midlands*	528·7	569·3	+ 7·6	3,552·7	3,641·6	+ 2·5	5,708·2	5,865·5	+ 2·8
South Wales*	277·5	286·0	+ 3·1	2,013·6	2,119·0	+ 5·2	3,030·9	3,244·4	+ 7·0
Merseyside and N. Wales*	309·3	306·5	− 0·9	2,185·6	2,075·1	− 5·1	3,481·0	3,357·9	− 3·5
Yorkshire*	498·9	543·1	+ 8·9	3,447·8	3,583·7	+ 3·9	5,488·9	5,682·6	+ 3·5
North Eastern*	312·9	320·5	+ 2·4	2,239·7	2,184·7	− 2·5	3,514·1	3,487·2	− 0·8
North Western*	586·4	592·2	+ 1·0	4,042·0	3,870·8	− 4·2	6,378·9	6,308·2	− 1·1
South East Scotland	109·7	117·7	+ 7·3	715·0	745·0	+ 4·2	1,168·9	1,219·1	+ 4·3
South West Scotland*	269·2	293·2	+ 8·9	1,747·6	1,786·9	+ 2·2	2,866·6	2,936·9	+ 2·5
Total all Area Boards	4,950·6	5,353·4	+ 8·1	33,527·0	34,045·0	+ 1·5	54,051·3	55,149·4	+ 2·0
Direct Supplies by Central Authority	59·8	64·8	+ 8·4	166·1	179·2	+ 4·1	702·9	728·1	+ 3·6
Grand Total	5,010·4	5,418·2	+ 8·1	33,987·4	34,524·2	+ 1·6	54,754·2	55,877·5	+ 2·1
Mainly Industrial Areas*	3,166·3	3,333·4	+ 5·2	21,852·4	21,938·4	+ 0·4	34,676·0	35,175·3	+ 1·4
Mainly Non-Industrial Areas	1,784·3	2,020·0	+ 13·2	11,674·6	12,106·6	+ 3·7	19,375·3	19,974·1	+ 3·1
Total Number of Working Days	27·13	27·72		221·30	222·07				

* Over half the total sales by the Boards in 1951–52 were to industrial consumers.

Table II sets out electricity sales by the Area Boards. The national figures show an increase over November, 1951, of 8·1 per cent, but, when corrected for weather, the increase is only 3·3 per cent. The weather conditions were colder than in November, 1951. It must be borne in mind that the figures for November are only provisional and the corrections for weather and number of working days approximate. In addition, no account is taken of the supplies received by Area Boards from other sources than the B.E.A.; these are comparatively small and have little effect on the percentage changes. Some of the factors influencing the rate of development mentioned previously for the Southern, South Wales, Merseyside and North Wales, North Eastern and North Western Areas still applied during November.

River Lee Hydro-Electric Development

The Electricity Supply Board, Dublin, has placed contracts for the main civil works in connection with the River Lee hydro-electric development. A French engineering firm, the Société de Construction des Batignolles, will construct the dam, power stations and ancillary works at Carrigadrohid and Inishcarra and John Paul & Co., of Dublin, will build the three major bridges and the new road diversions made necessary by the flooding of about 3,500 acres of land to form the reservoirs for the two power stations.

The larger of the stations will be built in the gorge at Inishcarra about 9 miles from Cork City and will have two generating sets (15,000 kW and 4,000 kW). Here the dam will have a maximum height of 173ft and will be about 813ft long. The reservoir created by this dam will provide a usable storage of about 21 million tons of water and the existing water level will be raised about 100ft. The second station at Carrigadrohid, about 10 miles up river from Inishcarra, will have an 8,000 kW generating set. The dam at this point will be about 70ft high and 350ft long, while the reservoir above the station will hold 25 million tons of water. Construction work will begin shortly and the scheme will take about four years to complete. The estimated average annual output is 80 million kWh.

Neepsend Chimneys

To avert some of the smoke pollution on the Shirecliffe estate, Sheffield, two 400ft chimneys are to be built at Neepsend power station. This was recommended to the British Electricity Authority by the Divisional Controller, Mr. G. A. Vowles. At a meeting of the Yorkshire Electricity Consultative Council at Sheffield it was announced that construction of the chimneys would begin early next year.

B.E.A. and Consultative Councils

Replies to Questions on Policy

THE relationship between the British Electricity Authority and the Consultative Councils was explained at a meeting of the Council for the East Midlands area which was addressed by Sir Henry Self, deputy chairman (administration) of the B.E.A., and Mr. E. R. Wilkinson, the commercial manager. The meeting was the result of an approach by the Council to the B.E.A. asking that it should be acquainted with the broad aspects of expenditure and future development plans of the Authority. Concern had been expressed that in discussing the accounts of the East Midlands Board the Council had been unable to deal with the 60–65 per cent represented by the bulk supply from the Central Authority.

Sir Henry Self pointed out that the Electricity Act did not allow for the consideration by any Council of the activities of the Authority, and it would be extremely difficult to have to discuss the Authority's plans with fourteen separate Councils. Occasional explanatory discussions on an informal basis were no doubt desirable from a public relations point of view, and answers were accordingly given to a number of questions which had arisen, including the following.

As a result of representations made by the Authority, the last two price variations of coal had been on a differential basis and this had gone some way towards rectifying the unfair flat rate increases of the past.

Priority was given, wherever possible, to supplying farms with electricity and the Authority would continue to advocate an increased capital allocation for rural development. Farmers should realize, however, that priority was given in order to raise food production and should make greater use of the supply than merely for lighting and other amenities in the farm house.

The electricity supply industry was only just recovering the goodwill jeopardized by the Clow surcharge and any further suggestions for special tariffs designed to reduce demands should be strenuously resisted.

Constructional economies in building new houses might prevent consumers from exercising freedom of choice of domestic apparatus to be installed. Furthermore, a limited installation might encourage tenants to undertake their own wiring, which might be dangerous. An indication was given that this matter would be thoroughly investigated by the Authority.

While the Authority was bringing pressure to bear in the appropriate quarter with regard to purchase tax on domestic labour saving appliances, it was felt that the main approach in this matter should be left to other interested organizations.

The depreciation policy of the Authority was inherited from previous undertakings and had been found to be the most beneficial having regard to its effect on retail tariffs.

There had been a recent change in the method of obtaining money for the Central Reserve Fund, the kW charge of the bulk supply tariff having been increased to provide a source of revenue to the Fund. This was considered equitable, since all Area Boards thus contributed.

At Christmas time some of the principal streets of Brussels are decorated and illuminated in a very lavish fashion. The lights were switched on recently and will remain in use until 2nd January. The effective nature of the illuminations is shown in the accompanying illustration which should give ideas to those responsible for Coronation decorations

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

Aberdare Cables Africa, Ltd.—The annual meeting was held in Port Elizabeth on 5th December, Sir George Usher (chairman) presiding. In his circulated statement, the chairman said that the year under review had been a record one, and the value of orders on hand at 30th June last was also a record. Since that date a further substantial volume of orders had been booked, as a result of which the planning of factory production now ran on well into 1953. The raw materials position had improved considerably. Plant for the production of p.v.c. insulated cables was now installed and they were finding a ready market for this type of cable. Plans were in hand for further expansion and development of plant to extend the range of products, particularly in regard to types of cable that were not at present manufactured in the Union.

Their associate company, Aberdare Electric Africa, Ltd., was now firmly established in the production of power transformers of up to 500 kVA capacity, and that company was now planning the development and manufacture of a new type of electrical equipment. There were hopes that the present control on the export of their products would soon be relaxed, and as soon as copper became more freely available, they would be ready to develop their export trade again.

Joseph Lucas (Industries), Ltd., held its annual meeting on 15th December, when Mr. A. B. Waring (chairman), who presided, said that apart from increased taxation the profit was adversely affected by a recession in the sales of motor vehicles. As against this setback in the motor industry, a substantial increase took place in the output of the aircraft industry. The consequences of the rise in wages, salaries and materials were considerable. Of first importance was the increased cost of copper and steel, which were the main raw materials of electrical equipment. The fall in prices of lead and zinc came too late in the year to have any appreciable effect on the results. There had been a substantial increase in demand for their electrical and mechanical control devices for aircraft and for gas turbines.

George Cohen Sons & Co., Ltd.—The directors announce that the consent of the Capital Issues Committee has now been received to the issue of 3,600,000 shares of 5s each, as capitalization of reserves. These shares will be issued as fully paid up, early in the New Year, in the proportion of three shares for every two ordinary stock units held by stockholders.

The Renold & Coventry Chain Co., Ltd., has announced an interim dividend of 3 per cent (same) on capital as increased by a 60 per cent scrip bonus and £377,105 rights issue.

Waygood-Otis, Ltd., is paying an unchanged interim dividend of 30 per cent.

Solus Teoranta (the Irish lamp-making concern) has declared an interim dividend of 5 per cent (unchanged).

Worthington-Simpson, Ltd., are paying an interim dividend of 10 per cent (same) on capital increased by a 10 per cent scrip bonus.

New Companies

Shoolbred Rewinds, Ltd.—Registered 2nd December. Capital £1,000. Electrical engineers, electricians, mechanical engineers, manufacturers of and workers and dealers in electric motors, and any other form of electrical apparatus or appliance, etc. Directors: A. F. Plummer, M. R. Plummer, R. A. Joseph and G. W. Ryall. Regd. office: 1, Langley Street, Luton, Beds.

Telemeter Installations, Ltd.—Registered 6th December. Capital £1,000. Electrical, mechanical, hydraulic and general engineers, electrical installation, wiring and maintenance contractors, etc. Directors: C. E. S. Clench, W. Smith and N. G. Jones. Regd. office: 119, Victoria Street, S.W.1.

M. & W. Electrical, Ltd.—Registered 25th November. Capital £1,000. Electrical engineers and general electrical installation contractors, radio and television engineers, etc. Subscribers: F. Yates and G. A. Hunt. Secretary: Graham A. Hunt. Regd. office: Russell Chambers, 2, King Street, Nottingham.

G. Zwicky (London), Ltd.—Registered 26th November. Capital £500. Manufacturers, importers, exporters and dealers in electrical and mechanical tools and machines, etc. Directors: T. Stewart and Paul T. Kavanagh. Secretary: Paul T. Kavanagh. Regd. office: 30, Southampton Buildings, Chancery Lane, W.C.2.

Stagesound (Production), Ltd.—Registered 5th December. Capital £5,000. To acquire the business of manufacturers, constructors and producers for sale of sound reproducing equipment and electrical equipment used in connection therewith carried on by Stagesound (London), Ltd., at 3, Dansey Place, W.1. Directors: W. J. F. Walton, Diana H. M. Plunkett, J. H. Madre and E. J. W. Turner. Regd. office: 16, Gerrard Street, W.1.

L. J. & I. W. South (Ryde), Ltd.—Registered 28th November. Capital £1,000. Manufacturers and sellers of wireless, television, electrical, musical and mechanical appliances, etc. Directors: A. J. Taylor, L. J. South and Mrs. Ivy W. South. Regd. office: Clydesdale Works, Simeon Street, Ryde, I.W.

William Willman, Ltd.—Registered 10th December. Capital £1,000. Electrical engineers; radio, television and electrical appliance dealers, etc. Directors: Mrs. Daisy D. Moore and J. Wallwork. Regd. office: 386, Blackburn Road, Accrington.

Intercommunications Equipment Co., Ltd.—Registered 11th December. Capital £1,000. Manufacturers of and dealers in all kinds of wireless and television apparatus, etc. Directors: C. Whipman and Nora O. Whipman. Regd. office: 18, Clifftown Road, Southend-on-Sea.

Enfield Electric, Ltd.—Registered 4th December. Capital £1,000. Electrical engineers and contractors, etc. Directors: F. W. G. Lansdowne and Mrs. Elizabeth L. Hockham. Regd. office: 45, Osborne Road, Enfield, Middx.

Liquidations

G. E. Stephens (Grays), Ltd., 142, Old High Street, Grays, Essex, electrical engineers. At the first meeting of creditors on 10th December a resolution was passed for the appointment of Mr. L. C. E. Webber, C.A., 32, Queen Anne Street, W.1, as liquidator, with a committee of inspection.

Hudsons Radilectels, Ltd., radio and electrical engineers.—At an extraordinary general meeting held on 4th December, a resolution was passed that, it having been proved to the meeting that the company can pay its debts in full, the company should enter into a members' voluntary winding-up and that Mr. A. G. Lee, of Hilton, Sharp & Clarke, 13, Ship Street, Brighton, be appointed liquidator. Particulars of claims to the liquidator by 31st December.

G.B.M. (Electrical) Birmingham, Ltd.—Particulars of claims by 31st January to the liquidator, Mr. G. J. Simmons, 16, Waterloo Road, Wolverhampton.

Bankruptcies

K. J. Wilkes, trading as John Wilkes & Co., 30, Catford Hill, London, S.E.6, radio and electrical dealer.—Receiving order made 9th December on a creditor's petition.

A. E. Dalmon and **S. J. Dalmon,** carrying on business in partnership as sanitary and electrical engineers, under the name of "P. Dalmon & Sons," at 60, Teville Road, Worthing.—First meeting held 24th December. Public examination 20th February at the Court House, Church Street, Brighton.

M. J. Ruddick, 89, Park Road, Wigan, Lancs, carrying on business as electrical appliance dealer.—First meeting held 19th December. Public examination 6th February at the Court House, Crawford Street, Wigan.

R. S. Lees, now residing and lately carrying on business at 21, Gledhow Park Road, Leeds, under the style of R. S. Lees & Co., as an electrical factor, now commercial traveller.—Application for discharge to be heard on 28th January at the County Court House, Albion Place, Leeds.

SOUTH AFRICAN TRADE

THE latest monthly abstract of trade statistics of the Union of South Africa shows that electrical imports during the first half of 1952 increased in value by about 25 per cent on the corresponding period of 1951. The accompanying table compares the chief items.

In September municipalities in the Union were asked by the Government to obtain from local manufacturers whenever possible any plant and equipment needed, thus saving foreign exchange. At the same time their attention was officially drawn to the progress made in local production of electrical apparatus, such as power station equipment.

Class of Goods	Six months Jan.-June	
	1951 £ (000)	1952 £ (000)
Batteries and parts	326	377
Dynamos and generators	553	537
Motors	962	1,147
Transformers	623	782
Cable and wire (rubber insulated) ..	280	130
Cable and wire (other)	626	736
Electric stoves and parts	126	193
Lamp bulbs	227	264
Radio apparatus and accessories ..	662	1,093

Exports of electric cable and wire during January–June, 1952, were valued at £68,000 against £614,000, and of machinery and parts, not agricultural, £2,729,000, compared with £2,336,000.

STOCKS and SHARES

WITH no very positive factors to counter seasonal influences, business in the Stock Exchange has contracted to insignificant proportions. Industrials have been standing firm, helped by some satisfactory company news and by the implications of a rise in Wall Street prices to the best levels for more than twenty years. In the gilt-edged market, however, the tendency has been towards the duller side. Opinions continue to be uneasy about the persistence of an abnormally wide gap between the Exchequer's expenditure and receipts, and the implications which this has for hopes of tax reliefs in the next Budget. Another unhelpful development was the announcement of an impending £20 million 5 per cent debenture issue at 98½ by the Anglo-Iranian Oil Co. Talk runs also on the possibility of new Government loans next year in connection with developments planned at the Commonwealth Conference.

B.I.C.C. Dividends

The 2 per cent interim dividend declared earlier this month by British Insulated Callender's Cables, Ltd., is at the same rate as last year's corresponding payment. It applies this time, however, to ordinary capital larger by about one-third as a result of the issue of more than three million new shares last March at a price of 22s. These did not qualify for the 1951 final dividend, which was raised from 5 to 7 per cent, to the pleasant surprise of the market at the time. The total of 9 per cent was paid out of earnings equivalent to 50 per cent on the capital ranking. According to the annual report, the current year began with sales markedly above the previous year's corresponding figures, so that maintenance of the dividend for 1952 seems to be as safe an assumption as the industrial market can expect to make these days. The indicated yield on the £1 shares at their present price of 33s 6d is £5 7s 6d per cent.

English Electric Contracts

English Electric £1 ordinary shares, currently quoted at about 58s, are among the few industrials likely to earn the distinction of finishing the year within easy reach of their best quotations over the twelvemonth. A substantial contributor to this result has been, no doubt, the success of the Canberra jet bomber. For investment purposes, the shares remain mainly associated with heavy electrical engineering and their standing in that respect was enhanced by the news of the $700,000 contract for transformers for the City of Seattle. English Electric is as a rule among the first in the field each year with its annual results and final dividend declaration: these were known last time before the end of February. On the total dividend of 15 per cent paid for 1951 (out of earnings equivalent to 57 per cent on the ordinary capital) the shares show a return of 5·2 per cent.

Crompton Parkinson Yield

The yield of over 6¼ per cent on Crompton Parkinson 5s ordinary shares at their present price of 8s 9d is rather above the average, as measured by the popular indices, on leading industrials. At the same time the shares have a firmly established investment reputation, which was reinforced by the expansion shown in the annual accounts published a month ago The increase of nearly £220,000 in the trading surplus was to a large extent drained off in higher tax provisions, but the earnings-cover for the 11¼ per cent dividend widened to practically twofold. A factor affecting less certainly the market in the shares is the extent to which the group's greatly expanded working capital requirements are being met by temporary borrowings, the total of bank overdrafts and loans being now more than £2¾ million. Mr. Parkinson dealt with this problem fully at the recent annual meeting, and reaffirmed the view that economic conditions made it undesirable for the company to raise additional permanent capital at present.

Thorn Electrical Loan

Dealings are taking place at about 99 in Thorn Electrical Industries 5¼ per cent unsecured loan, of which £500,000 stock was offered this month to holders of the company's preference and ordinary capital. The money is being raised for the purpose of financing the development of fluorescent lighting production and radar components, and for the initial stages of Government contracts. The company's statement accompanying the issue says that turnover in the current year is likely to be well maintained, but net profits will probably be less because of a reduction in profit margins. Profits are expected, however, to be considerably better than the average over the past ten years and the service of the loan is regarded as well secured. Net assets of the group, including the proceeds of this issue, exceed £2 million, so that the stock is more than four times covered in that respect. The loan is to be repaid at par in 1964, or at various premiums from 1960 onwards.

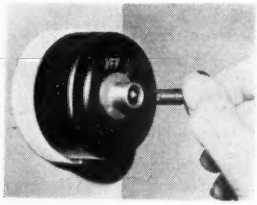
As this issue of the *Electrical Review* has to go to press earlier than usual our share lists are omitted this week.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Key Operated Rotary Switches

TO meet the demand for rotary switches which can be operated only by authorized persons, TOK ELECTRICAL AND INDUSTRIAL MECHANISMS, LTD., 2, Wadsworth Road, Perivale, Middlesex,



Rotary switch designed for key operation

has introduced a range of key operated switches. They are available with ratings of 5 A, 10 A, or 20 A for voltages up to 600 V d.c. or a.c. Over fifty different switching sequences are available in each size.

All-Insulated Service Fuse

A 200 A all-insulated service fuse with suitable moulded neutral box and sealing chambers has just been put on the market by SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38/39, Upper Thames Street, London, E.C.4. The fuse box is of similar design to the standard "R" type 60/80 A service fuse and will accommodate English Electric type "RF" cartridges of 100, 125, 160 and 200 A ratings.

Two sizes of sealing chambers are available, one for 2-core and the other for 4-core cables up to 0·15 sq in. The neutral box is in a similar moulding to the fuse but it is fitted with a bolted link and flat top lid.

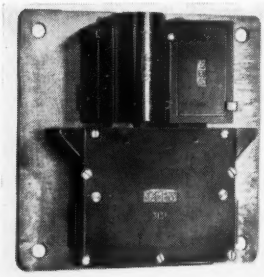
World Clock

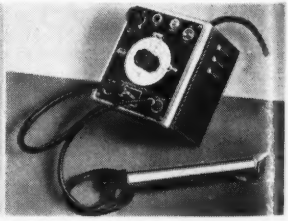
The latest electric clock to be introduced by SMITHS ENGLISH CLOCKS, LTD., Sectric House, Waterloo Road, London, N.W.2, shows the time in twenty-three principal towns all over the world. It is housed in a moulded brown case which is no larger than the average office clock. An inner dial which revolves slowly is divided into night and day with the twenty-four hours marked by Roman numerals; the hours are further divided into quarters. The other circle has the towns outlined in red with an arrow pointing to the time. This clock costs £5 19s 11d, including purchase tax in the United Kingdom.

Electronic Temperature Controller

The temperature of water baths and similar laboratory apparatus can be governed within fine limits by the electronic temperature controller which has recently been made available by MULLARD, LTD., Century House, Shaftesbury Avenue, London, W.C.2. The sensitive element in this instrument is a temperature-sensitive resistor designed for direct immersion in the fluid to be controlled. This resistor forms one arm of an a.c. bridge network, the output from which is amplified and used to control a phase-sensitive circuit operating a relay which can switch up to 1 A at 230 V.

The instrument has a temperature range of 15 to 75 deg C in three steps and although the calibrating accuracy is ± 1 deg C it is possible to control the temperature between $\pm 0{\cdot}02$ deg C





Left: **Siemens two-pole all-insulated service fuse with neutral box and sealing chamber.** *Centre:* **Smiths world clock.** *Right:* **Mullard laboratory type temperature controller**

about the working point. The instrument will operate from 100/120 V or 200/250 V 50 c/s mains and the power consumption is 25 W.

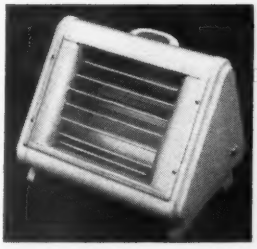
Shop Window Lighting Unit

A shop window reflector lighting fitting made by CREASEY & Co., 1 & 2, Regent Square, London, W.C.1, is constructed of wood and incorporates a 2ft 20 W fluorescent tube. The light is thrown upwards through a frosted glass plate and the control gear for the tube is housed within the unit. The dimensions are 27·5in by 11in by 3·25in and the unit is suitable for operation from 200/250 V a.c. mains. It is priced at £5 5s including the tube. The mirror shown in the illustration is available as an extra, if required. A smaller unit is also available which uses a 284 mm 30 W strip lamp as the light source and this costs £2 complete.

Creasey shop window lighting fitting

Portable Fire

HEATRAE, LTD., Heatrae Works, Norwich, announces that it has redesigned its "Dandy" fire to conform to the new B.S. 1670 for safety guards. The overall dimensions (13¾in high by 16¾in wide by 12in deep) remain the same and it is claimed that the safety requirements have been met without in any way detracting from the fire's pleasing appearance. The "Dandy" 2 kW fire is priced at £6 4s 0d, plus £4 10s 8d purchase tax in the United Kingdom.



Redesigned "Dandy" fire

Torch Batteries

We are informed that "Ray-o-Vac" American-type leakproof torch batteries are now being made in this country by ALPHA ACCESSORIES, LTD., Cae Mawr Factory, Treorchy, Rhondda, Glam. These batteries have a very long shelf life and may be safely left in a torch as long as is wished. Every battery carries a guarantee that should a torch be damaged by corrosion, leakage or swelling the torch will be replaced.

Fish Cabinet

A "Presmetic" hermetically-sealed absorption unit is employed in the new Prestcold fish cabinet made by the PRESSED STEEL CO., LTD., Cowley, Oxford. Model F.C.103 has a capacity of 10 to 12 stone of wet fish accommodated in four galvanized steel drawers each measuring 19¾in by 14¾in by 7in deep and so designed that water drains to the back of the cabinet, preventing dripping into lower drawers. A large size drain removes excess water from the storage cabinet. The temperature of the cabinet is thermostatically controlled and a self-resetting switch protects the refrigerator from damage.

The cabinet employs the cold-wall principle which gives full unrestricted internal capacity with high humidity conditions for the storage of wet fish and fillets, and is insulated with a 3in thickness of "Fibreglass" throughout.

The overall dimensions are 29 $\frac{3}{16}$in wide by 26in deep by 54in high and the external finish is of hard wearing white synthetic enamel.

Prestcold F.C.103 fish cabinet

NEWS FROM BRAZIL

From our Rio Correspondent

PRESIDENT VARGAS, in a speech broadcast to the nation in October, referred to the advances made in the electrical field during the past year. The projects already being carried out will increase installed electrical capacity by 640,200 kW, while those on which work will start early in 1953 will add another 359,000 kW. The total estimated outlay, to be spread over five years, amounts to £100,962,000, of which £60,962,000 will be spent on imports.

The projects now under way provide for the following increases in installed capacity:

Rio Grande do Sul, 103,000 kW; Sao Francisco power station, 60,000 kW; Companhia Nacional de Electricidade (Catanduva), 34,000 kW; Companhia Electrica do Alto Rio Grande, at Utinga, 36,200 kW; Salto Grande power station in Sao Paulo, 60,000 kW; Empresas Electricas Brasileiras, in various cities of North-east Brazil, 175,000 kW; Brazilian Traction, Light and Power, in the Federal District and State of Rio, 160,000 kW; and Macabu hydro-electric station, State of Rio, 12,000 kW.

Plans for the following stations have been drawn up and work should start early in 1953:

Rio Pardo, 75,000 kW; Jequia, 45,000 kW; Companhia Mato Grossense, 100,500 kW; State of Parana, 62,500 kW; State of Santa Catarina, 26,000 kW; and Companhia de Electricidade do Alto Rio Doce, 50,000 kW.

Completion of Macabu Project

Work on the Macabu station, referred to by President Vargas, was begun by a Japanese firm in 1939 and suspended when Japan entered the war. It was then taken over by the Rio State Government and in spite of wartime difficulties 75 per cent of the programme, which includes linking up and extending several small supply systems, was concluded in 1949 at a cost of £3,760,000. Grants under the "Salte" Plan are being drawn upon to complete the station on the Macabu River and raise installed capacity in the northern part of the State.

A credit of £3,000,000 was authorized in September to cover the cost of building and equipping the Candiota power station in Rio Grande do Sul. The sum includes £1,400,000 for materials to be imported.

The government of the Amapa Territory is to build a 100,000 kW hydro-electric station at Paredao, on the Araguari River. Negotiations are now being concluded for a loan of U.S. $3,000,000, to be guaranteed by a tax on exports of manganese from the Territory.

Rede Mineira de Viacao proposes to build and equip a 5,000 kW power station at Oito Arrobas, near Itavera. The station, which is estimated to cost £400,000, will permit electrification of the short section of railroad between Barra Mansa and the port of Angra dos Reis, in the State of Rio.

Trolley-buses for Federal District

The Rio Municipality proposes to install two trolley-bus routes in the Federal District. The first Brazilian city to operate trolley-buses was Sao Paulo.

The Fortaleza (Ceara) Municipality has approved an expenditure of £612,000 for the import of diesel generators to improve the city's light and power services.

One of the earlier systems of illumination by mercury vapour lamps has been in use for some time past in one of Rio's tunnels. A more modern type of fluorescent lamp has been acquired in the United States and is about to be tried out in another quarter of the city.

The Rio Jockey Club recently completed a new, and very satisfactory, system of lighting the race course for night racing in which 1,500 W incandescent lamps alternate with 500 W mercury vapour lamps. Electricity is taken from the public supply at 6,000 V and is stepped down to 220 V in five underground sub-stations.

The Rio Municipality has opened a credit of £300,000 to Radio Roquete Pinto, belonging to the Municipal Department of Education, to erect a television station at Rio. Licences to establish broadcasting stations have been issued to Radio Excelsior S.A., for a 50 kW short wave station at Rio de Janeiro, and to Radio Nacional for a 10 kW medium wave station at Sao Paulo.

Oil-Filled Cable Link

Installation Under Adverse Conditions

THE contract for a 33 kV oil-filled cable link between Rye House generating station and the 132 kV grid has recently been completed by W. T. Henley's Telegraph Works Co., Ltd. The British Electricity Authority's engineering staff at headquarters and in the Eastern Division were responsible for the design and execution of the work, the installation and the design of the oil system being carried out by Henley's.

The contract provided for the supply, laying, jointing and terminating of nearly $2\frac{1}{4}$ miles of 0·4 sq in three-core and over $\frac{3}{4}$ mile of 0·4 sq in single-core 33 kV oil-filled cables, $2\frac{3}{4}$ miles of 30-core 7/0·029, and one mile of twelve-core 7/0·029 p.i.l.c. s.w.a. and served auxiliary cables. The installation work was carried out under the supervision of Henley engineers.

The 33 kV cables will ultimately comprise four circuits between the generating station 33 kV outdoor switchgear and four 45 MVA 33/132 kV step-up transformers. Each circuit is to consist of a run of about 500 yd of two cables, each having a straight-through joint half-way along its route in a common joint bay. Each three-core cable trifurcates into three single-core fluted lead sheathed cables at each end and these terminate in vertical outdoor sealing ends. Thus the jointing and terminating of the 33 kV cables will finally embrace eight straight-through joints, 16 trifurcating joints, and 48 sealing ends.

The installation of the multi-core cables comprises 15 connections for relay control and indication circuits between the grid site and relay rooms in the 33 kV outdoor switching station and the generating station control room. An earthing conductor was also laid between the grid site and the 33 kV switching station.

The contract was successfully carried out in adverse weather and site conditions, for the cable trenches were flooded by both rain and seepage, the site being adjacent to the River Lea. Continuous pumping was necessary to keep the water level down. It was also necessary to divert a stream temporarily while ducts were laid across its natural bed. Acknowledgment is due to Mr. W. N. C. Clinch, M.I.E.E., M.Inst.F., controller, Eastern Division, B.E.A., for permission to publish this article and illustration.

Joint bay for the 33 kV oil-filled cables

Power for Eastern Quebec

WORK will begin early next year on a $100 million Quebec Hydro-Electric Commission project to serve the expanding industrial needs of Eastern Quebec. The announcement was made recently by Premier Duplessis, who said the project had been described as the largest single hydro-electric development ever undertaken in Quebec. The plans involve the construction of a 1,000,000 h.p. plant on the Great Bersimis River, in wild country 85 miles north of Forestville; a dam 200ft high and 2,500ft long at the mouth of Lac Casse, 15 miles north of the power plant, creating a reservoir covering an area of 260 square miles; and an eight mile tunnel, 36ft in diameter (part of it 700ft underground) in which the waters of the Bersimis will fall 870ft by the time the turbines are reached. Four 31-mile submarine cables will be laid across the St. Lawrence River.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 4th February from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1947

27035. Telephone Manufacturing Co., Ltd., and Eckersley, P. P.—Electric wave apparatus. 5th October, 1947. (686821.)

33152. British Thomson-Houston Co., Ltd., Privett, H. L., Clarke, M. G., and Ruff, H. R.—Operation of electric-discharge lamps. 17th January, 1949. (686822.)

1948

9670. Chalhoub, C.—System for controlling and regulating the frequency of electrical oscillation. 6th April, 1948. (686901.)

20837. British Thomson-Houston Co., Ltd.—Electrode structures for gaseous electric-discharge devices. 6th August, 1948. (686824.)

1949

2771. General Electric Co., Ltd.—Electron discharge switching devices. 11th January, 1950. (686826.)

14157. National Research Development Corporation.—Pulse code modulators for telecommunication systems. 24th May, 1950. (687063.)

14591. Standard Telephones & Cables, Ltd.—Electronic scanning systems. 31st May, 1950. (686829.)

15259. Standard Telephones & Cables, Ltd., and Beck, A. H. W.—Electron discharge apparatus. 8th June, 1949. (686830.)

18103. British Tabulating Machine Co., Ltd.—Electronic switching circuits. 8th July, 1949. (686986.)

19942. Standard Telephones & Cables, Ltd.—Crystal triodes. 28th July, 1950. (686907.)

27760. Thomas, C. H.—Electric immersion heaters. 6th November, 1950. (686833.)

33341. Hollister, F. L.—Electric current switches with magnetically controlled contacts. 30th March, 1951. (686839.)

1950

1899. Haab, O.—Combined electrically driven date indicator and clock. 24th January, 1950. (686841.)

3311. Automatic Telephone & Electric Co., Ltd.—Automatic selector switches as used in telephone and like systems. 26th January, 1951. (687070.)

4235. Automatic Telephone & Electric Co., Ltd.—Electrical signalling systems suitable for use in mines or the like. 6th February, 1951. (687002.)

5449. Philips Electrical Industries, Ltd.—Electron optical image converter tubes. 3rd March, 1950. (686846.)

5852. Dungler, J.—Electromagnetically operated rotation reversing means. 8th March, 1950. (687006.)

14011. Advance Transformer Co.—Electric transformers. 5th June, 1950. (686856.)

14429. Standard Telephones & Cables, Ltd.—Crystal diodes and triodes. 1st June, 1951. (Cognate application 21040, 25th August, 1950). (686915.)

21365. British Insulated Callender's Cables, Ltd.—Overhead electric line and conductor therefor. 28th August, 1951. (687084.)

22149. Crabtree & Co., Ltd., J. A., and Hill, W. E.—Electric terminals. 23rd July, 1951. (686860.)

23337. National Research Development Corporation.—Electrical ignition apparatus. 21st September, 1951. (686925.)

26794. Automatic Electric Laboratories, Inc.—Voice frequency signalling in telephone systems. 2nd November, 1950. (687087.)

27748. Glover & Co., Ltd., W. T.—Manufacture of insulated electric conductors. 13th November, 1951. (687088.)

27849. Hall, J. W.—Piezo-electric crystal controlled frequency selective apparatus. 14th November, 1951. (686979.)

28344. Metropolitan-Vickers Electrical Co., Ltd.—Sealing glands. 31st October, 1951. (687120.)

28414. Plessey Co., Ltd.—Moving-coil loudspeakers. 21st November, 1951. (686934.)

28439. General Electric Co., Ltd., and Bryden, J. E.—Frequency modulation signalling systems. 16th November, 1951. (686936.)

28444. Soc. Francaise Radioélectrique.—Multi-channel radio communication networks. 21st November, 1950. (686937.)

28933. Marbourn, Ltd.—Dolly-operated electric switches. 2nd November, 1951. (686940.)

28969. British Thomson-Houston Co., Ltd.—Laminated magnetic cores for electromagnetic induction apparatus. 27th November, 1950. (686872.)

29298. International Register Co.—Combined electric motor and buzzer constructions. 29th November, 1950. (687030.)

29756. British Thomson-Houston Co., Ltd.—Laminated magnetic cores. 5th December, 1950. (686873.)

30417. C.A.V., Ltd.—Dynamo regulators. 20th November, 1951. (686941.)

30619. Stagnaro, D.—Bayonet-type electric lamp holders and the like. 15th December, 1950. (686874.)

31030. British Thomson-Houston Co., Ltd.—Oil-filled electrical apparatus. 14th November, 1951. (686943.)

1951

4299. Westinghouse Electric International Co.—Keying circuits for oscillators. 22nd February, 1951. (687038.)

5113. Standard Telephones & Cables, Ltd.—Crystal triodes. 2nd March, 1951. (686948.)

7950/1. United-Carr Fastener Corporation.—Electric lamp sockets. 5th April, 1951. (686949 and 686885.)

8174. Svenska Aktiebolaget Gas-Accumulator.—Radio beacons. 9th April, 1951. (686886.)

8183. British Thomson-Houston Co., Ltd.—Method of and apparatus for mounting filament wire for electric lamps. 9th April, 1951. (687094.)

9428. Belling & Lee, Ltd.—Devices for gripping and extracting thermionic valves from their holders. 23rd April, 1951. (686888.)

9751. Bristol's Instrument Co., Ltd. (Bristol Co.).—Synchronous invertor apparatus. 26th April, 1951. (686890.)

14186. Westinghouse Electric International Co.—Electric circuit interrupters. 15th June, 1951. (687051.)

20374. Standard Telephones & Cables, Ltd.—Electric crystal rectifiers. 29th August, 1951. (686958.)

21955. Allmanna Svenska Elektriska Aktiebolaget.—Method of heating longitudinally extending metal articles in electric high-frequency induction furnaces. 19th September, 1951. (686959.)

26330. General Electric Co., Ltd., and Rousseau, J. C.—Automatic telephone systems. 9th November, 1951. (687098.)

26783. British Thomson-Houston Co., Ltd.—Hall effect devices. 15th November, 1951. (687130.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—SYDNEY.—15th January. County Council. Supply of 33 kV cable. (C.R.E. 41979/52. Ten/5331.)*

India.—30th January. India Store Department. Wireless sets and equipment. (See this issue.)

NEW DELHI. — 13th January. Directorate General of Supplies and Disposals. Train lighting dynamos. (C.R.E. 41860/52. Ten/5329.)*

New Zealand.—WELLINGTON.—28th January. Director-General (Stores Division), G.P.O. Bridge testing sets, ammeters and voltmeters. (C.R.E. 41807/52. Ten/5324.)*

31st March. Tenders Board, Ministry of Works. Supply of 30,000 b.h.p. water turbines (tender No. N.1286) and 21,000 kW water-driven alternators for Atiamuri power station (tender No. N.1287). (C.R.E. 41797-8/52. Ten/5335-6.)*

South Africa. — PRETORIA. — 8th January. Union Tender and Supplies Board. Supply of seventy-five 12 V accumulators. (C.R.E. 41994/52. Ten/5326.)*

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Arlesey.—Secondary modern school; Bedfordshire Education Committee, Shire Hall, Bedford.

Ashford (Kent).—Shops and flats on the Beaver Green shopping centre; J. Sudlow, clerk to U.D.C., Church Road.

Beckenham. — Alexandra County Junior School; E. Mayorcas, architect, 13, David Mews, London, W.1.

Billingham-on-Tees. — Flats (42) behind Roseberry Road shopping centre for the U.D.C.; J. H. Shepherd, surveyor.

Birmingham. — Extensions, St. Patrick's R.C. School, Dudley Road; Harrison & Co., architects, 85, Cromwell Street, Birmingham.

Bishop Auckland.—Dining hall and kitchen block at Bishop Auckland Girls' Grammar School for Durham C.C. (£19,000); George Stephenson, Ltd., builders, Chester Street, Bishop Auckland.

Blandford (Dorset).—Houses (24), Bryanston estate; T. H. Cullen Davies, clerk of the Council, "Nordon," Salisbury Road, Blandford.

Brentford and Chiswick. — Flats and maisonnettes (150), Ealing Road site; W. F. J. Church, town clerk, Town Hall, W.4.

Bridport.—Houses, flats and bungalows (72), Bradpole estate; L. F. A. Maddocks, R.D.C. surveyor, Victoria Grove.

Bristol.—R.C. school, Muller Road; Burrough & Hannam, architects, 17, Orchard Street.

Factory, Brislington Trading estate; Iron & Marble Co., Ltd., 33, Victoria Street.

Bromley.—Eight shops and ten garages, Hayes Place estate; W. J. Eaglen, Ltd., 6, Dorset Road, S.E.9.

Burnley.—School at Rosegrove (£53,550); borough surveyor, 22/24, Nicholas Street.

Burton-on-Trent.—Six-storey block of flats; borough surveyor.

Chelmsford.—Covered swimming bath on site adjacent to open air bath; V. J. Willis, borough surveyor, Duke Street.

Chepstow.—Houses (44), at Portskewett; S. Thomas, architect to R.D.C., 26, Commercial Street, Newport.

Chesterfield.—Old people's bungalows on Pevensey estate, 18 flats on Newbold estate and 16 council houses in Wythburn Road, Newbold; borough architect.

Colne Valley.—Houses (50); U.D.C. surveyor.

Coventry.—Houses (848), on the Tile Hill and Bell Green neighbourhood units; D. E. E. Gibson, city architect, Bull Yard, off Warwick Row.

Depot and offices, Torrington Avenue; Vacuum Oil Co., Ltd., Caxton House, S.W.1.

Darlington.—Houses (186) for T.C., E. A. Tornbohm, borough architect, Central Buildings.

Primary school, Hutton Avenue (£58,000); George Dougill & Sons, builders, Chestnut Street.

Durham.—Public library, Murton Colliery; G. R. Clayton, county architect, Court Lane, Durham City.

Shops and flats on the Sunderland Road estate; city engineer, Town Hall.

Ealing.—Houses and flats (280) on estates at Lime Trees and South Ealing Road; C. W. Seddon, borough engineer, Town Hall, W.5.

Eccles.—Flats at Mill site, Church Street; F. Bradley, architect, Penny Bank Chambers, Wood Street, Bolton.

Friern Barnet.—Flats (30), Simmons Way; Braddock & Martin-Smith, architects, East Gallery, St. John's Church, N.W.8.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

Gateshead.—Secondary school, Hill Head (£132,000); H. J. Cook, chief architect, Municipal Buildings.

Development of new housing estate of 380 acres at Blackhill Hill, Heworth; chief architect.

Hambledon.—Houses, flats and bungalows (58), at Alford; S. P. Youldon, surveyor, Council Offices, Bury Fields, Guildford.

Harold Wood (Essex).—Extension to West Ham Lodge Hostel, Avenue Road; Thomas E. North, architect, 70, West Ham Lane, E.15.

Hebburn-on-Tyne.—Houses (260), Monkton Lane estate for U.D.C.; R. C. Bestow, surveyor.

Keighley.—Houses, Calver Avenue estate (108), Sun Street estate (14) and Hebden Road, Oxenhope (10); borough architect.

Leek.—Extensions to Council Offices; R.D.C. surveyor, Russell Street.

Leighton Buzzard.—Housing estate, Mentmore Road, Linslade; H. A. Rolls, architect, 15, Bridge Street.

London.—Paddington.—Flats (113), Fulham Place; borough housing architect.

St. Pancras.—Offices, workshops and stores, Maiden Lane; Metropolitan Water Board, 173, Rosebery Avenue, E.C.1.

Manchester.—Hotel, Rusholme; A. R. Johnson, architect, 11, Peter Street, Manchester.

Secondary schools at Moss Nook and Oldwood, Wythenshawe; city architect, Town Hall.

Middlesbrough.—Heating and ventilating installations at the Town Hall (£20,000); J. Kenyon, borough surveyor, Town Hall.

Newcastle-on-Tyne.—Extensive alterations and improvements to block of offices in Market Street; T. Clements & Sons, Selborne Gardens.

Erection of 144 houses and flats on the Copperas Lane estate for City Council; R. Bowey & Son, Ltd., builders, Back Raby Street.

Newcastle-under-Lyme.—Houses (152) for National Coal Board; Selleck, Nicholls & Co., Ltd., East Hill, St. Austell.

North Riding.—Primary school at Northallerton; J. H. Napper, architect, 56, Eldon Place, Newcastle-on-Tyne.

Oldham.—R.C. church, Fitton Hill estate; Canon Fitzgerald, St. Patrick's Church.

Oxford.—First section of college of technology, art and commerce (£240,000); E. G. Chandler, city architect, Town Hall.

Peterborough.—New premises for Wittering C.E. School (£27,849); Ruddle & Wilkinson, Longcauseway, Peterborough.

Plymouth.—Additional classrooms at St. Paul's R.C. School; W. C. Mangan, architect, 2, Ribblesdale Place, Preston.

Rainham (Essex).—Dwellings (105), Gainsborough Road area; Parrish (Builders), Ltd., 137, Billet Lane, Hornchurch.

Rawtenstall.—Houses (32), Staghills estate; borough surveyor.

Ripon.—Houses (280), Lead Lane; city engineer, Town Hall, Ripon.

Seaton Valley.—Houses (100) for U.D.C.; surveyor, Council Offices, Seaton Delaval.

Sedgley.—Houses (70), Stickley Lane site extension; A. Young, architect, 3, Newhall Street, Birmingham.

Slough.—Dwellings (400), Wexham Court Farm estate; borough engineer.

Smethwick.—Houses (202), Perry Hill Housing Scheme No. 2; borough surveyor, Council House.

Erection of George Betts Junior and Annie Lennard Infants' Schools; Reuben Holbrow & Partners, quantity surveyors, 68, Harborne Park Road, Birmingham.

South Shields.—Block of 15 flats, Lawe Road, and houses (30), Ravensworth Terrace; J. Reid, borough engineer.

Spalding.—Conversion of Holland House into maternity home; Holland County Council architect, Boston.

Sunderland.—Erection of a shopping centre (23 shops) on the Pennywell estate; Sir R. McAlpine and Sons, builders, Star Buildings, Newcastle-on-Tyne.

Shops and flats at Castletown; T. H. Rae, quantity surveyor, 5, Belford Terrace.

Flats (300), Hendon; borough architect, Grange House, Stockton Road.

Thornaby-on-Tees.—County school; county architect, County Hall, Northallerton.

Houses (36), Diamond Road; borough engineer.

Tottenham.—Flats (40), and lock-up shops, High Road/Northumberland Park; M. Lindsay Taylor, town clerk, Town Hall, N.15.

Tynemouth.—Houses (12) at The Broadway; A. & E. Brannen, builders, Trevor Terrace, North Shields.

Washington (Co. Durham).—Canteen at Glebe Colliery for N.C.B.; Board's Architects' Department, Ashfield Towers, Gosforth, Newcastle-on-Tyne.

Wellington.—Secondary modern school at Wrockwardine Wood, for Salop E.C.; C. H. Simmons, county architect, Column House, London Road, Shrewsbury.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 17th January.

REMAX. No. 708,682. Class 9. Electric accumulators, batteries, ammeters, ignition coils, commutators, condensers, cut-outs, connectors, distributors and parts thereof included in Class 9, lenses, pressure gauges, liquid gauges, electric junction boxes, speedometers, switches, insulated electric wire, cables, and wireless telephone receiving apparatus for land vehicles.—Remax, Ltd., Remax House, Alfred Place, London, W.C.1.

B.I. CALLENDER'S (design). No. 711,060, Class 9. Electricity transmission systems and parts thereof and fittings therefor, all included in Class 9.—British Insulated Callender's Cables, Ltd., Norfolk House, Norfolk Street, London, W.C.2.

ANTEWAND. No. 711,769, Class 9. Aerials.—Wolsey Television, Ltd., 75, Gresham Road, Brixton, London, S.W.9.

OSMOR Q. No. 711,937, Class 9. Components parts included in Class 9 of radio apparatus.—Osmor Radio Products, Ltd., Bridge View Works, Borough Hill, Croydon, Surrey.

DORMAN DIOLUME. No. 711,065, Class 11. Electric lighting fittings.—Dorman & Smith, Ltd., Ordsal Electrical Works, Salford, 5.

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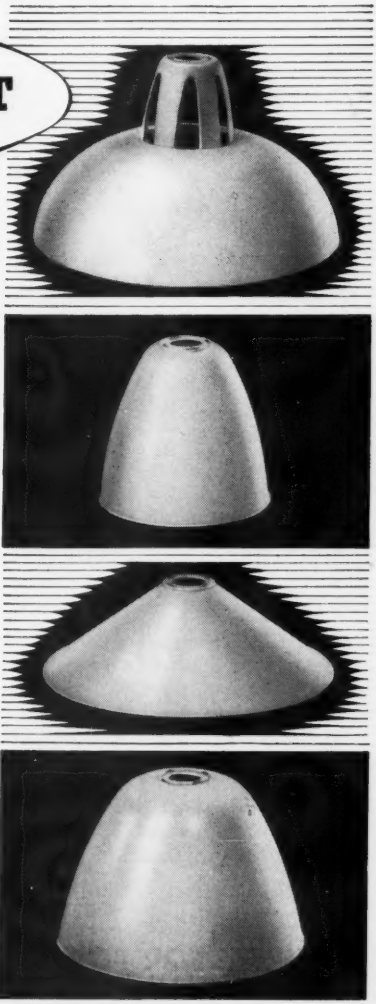

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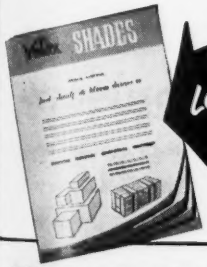

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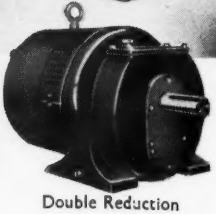

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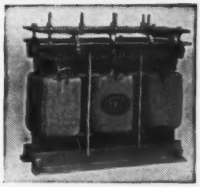

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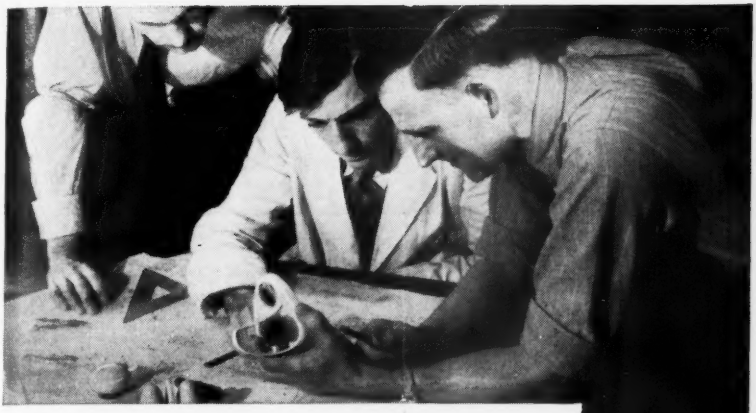

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This is the sixth in a series of announcements designed to assist Buyers in purchasing plastics moulded articles or components.

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This service, where it exists, is invariably offered free of charge; so if you are a Buyer of plastics mouldings on a substantial scale, make sure that the service is there, even if you do not plan to use it at the moment. You may want it some day.

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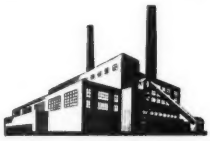
Thanks to all concerned in the building of new Power Stations and the extension of existing Power Stations, a record amount of new generating plant, with a capacity between 1,150,000–1,400,000 kilowatts, is being installed this year. And in the coming winter large industrial and commercial consumers are being required to reduce their peak load demands by a smaller amount than last winter, and over a shorter period.

Care still needed

All this is good news; but care is still needed. If the coming winter is a hard one — unlike last year's mild winter — there is still a danger of overloading the available plant, with resulting inconvenience and loss of production in the factories. That is why the general public are still being asked to co-operate by going easy with their electricity in the early mornings and late afternoon, particularly on cold days.

To reduce yet further the risk of interruption, Industry is asked to ensure that it makes the most efficient use of power. If all play their part, both in industry and in their homes, the nation can benefit by all the advantages of increased production and improved amenities that the electrical age has in store.

For more production—Use power WISELY!



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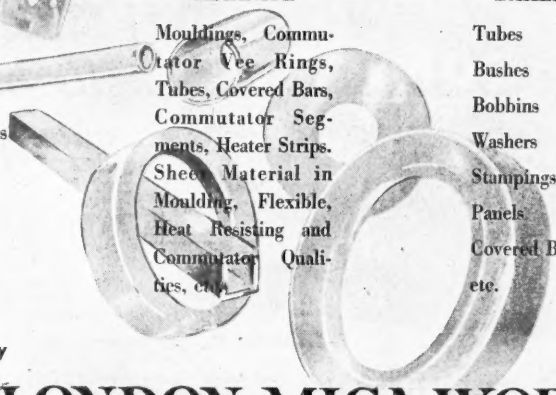

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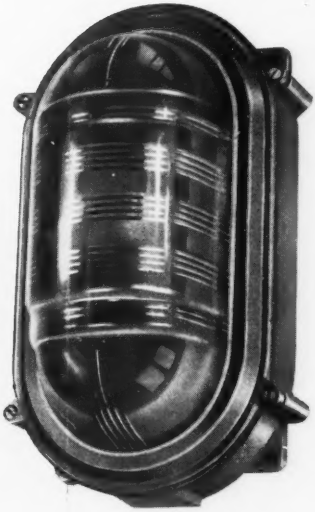
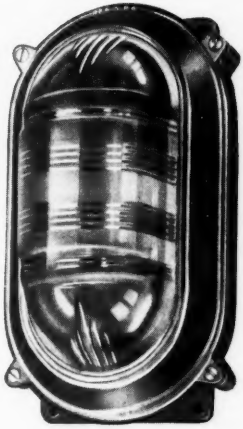


60 WATT
LIST No. SP.6



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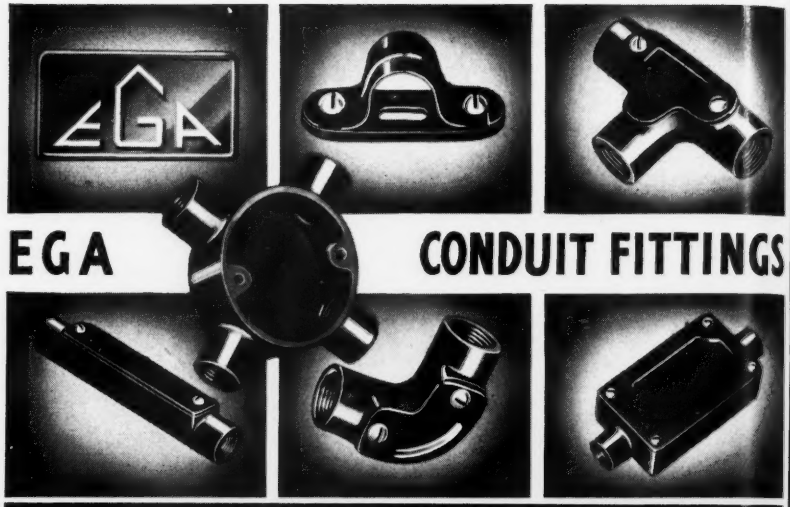

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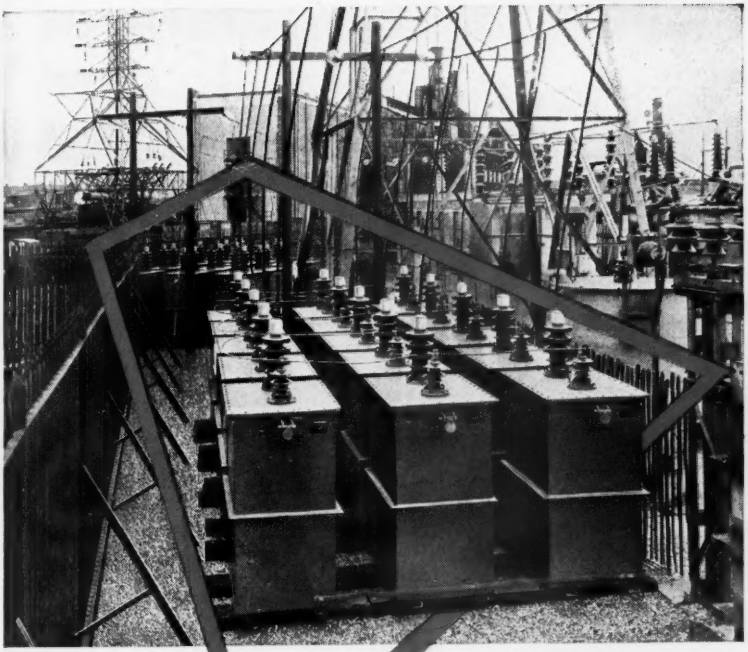

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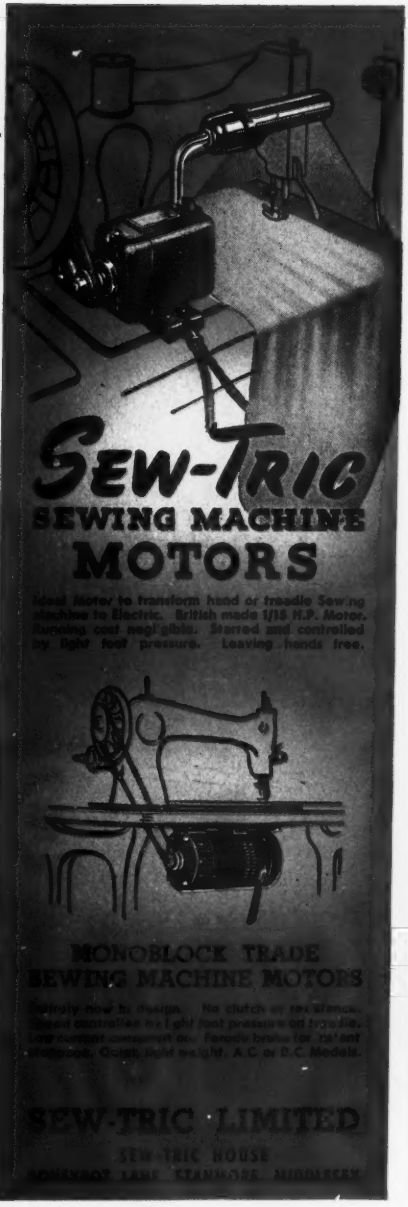
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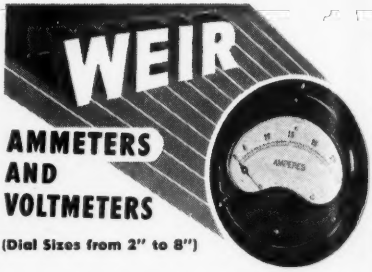

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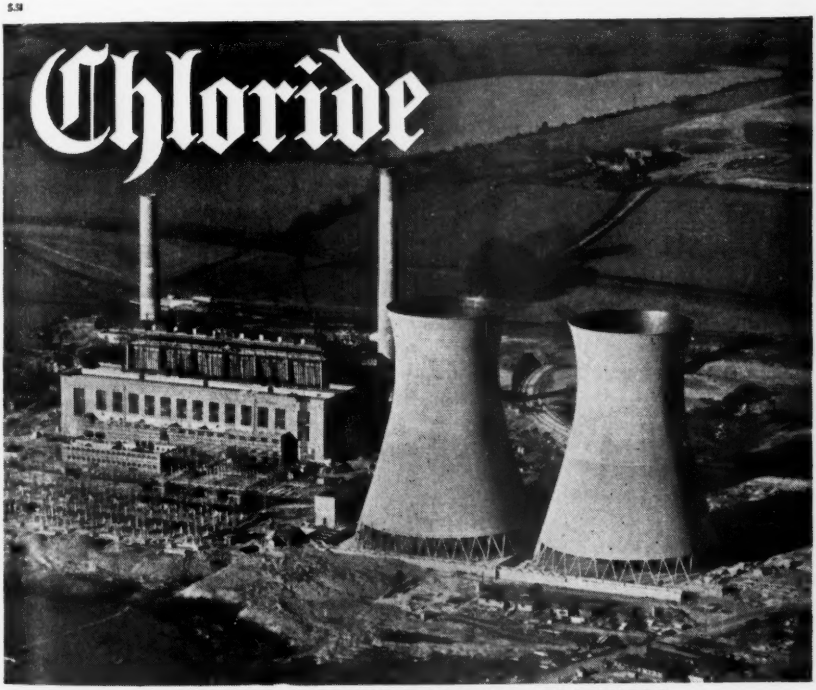

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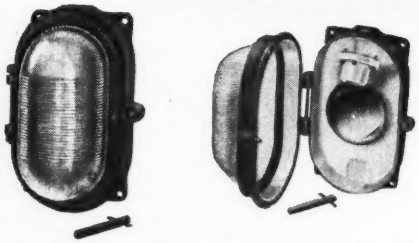

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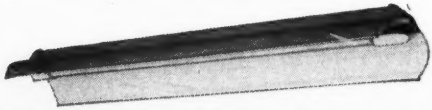

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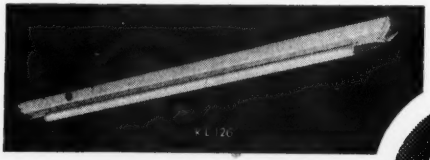

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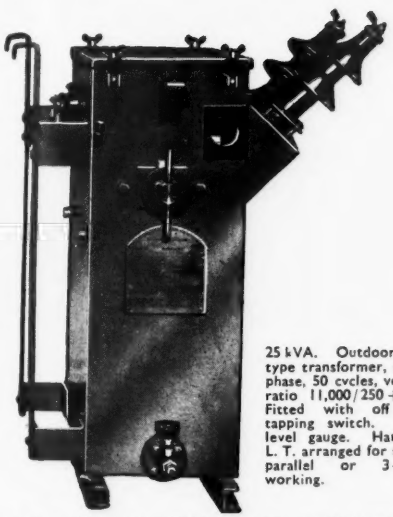

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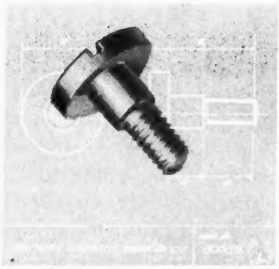

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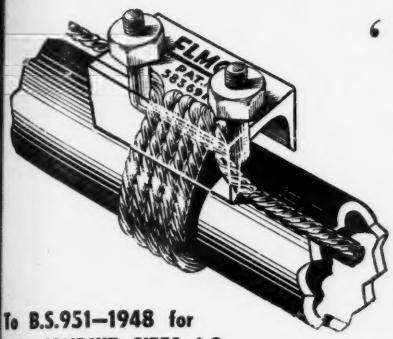

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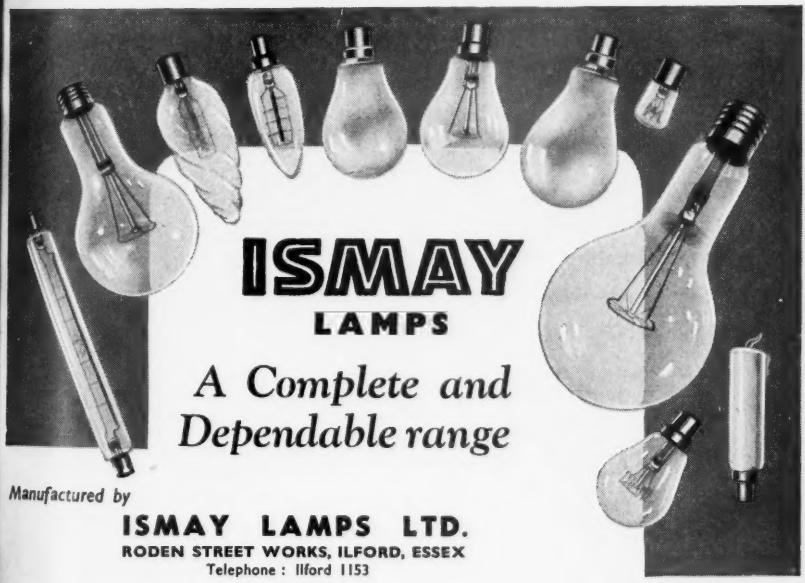

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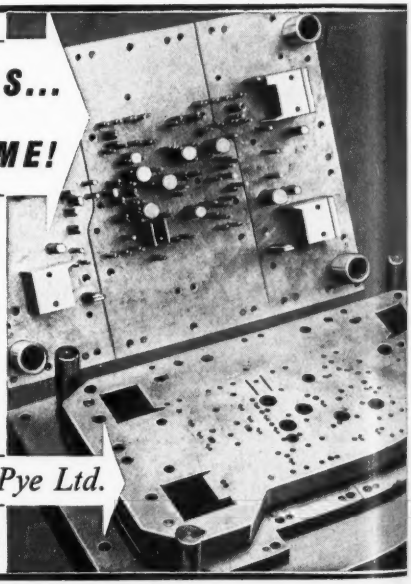

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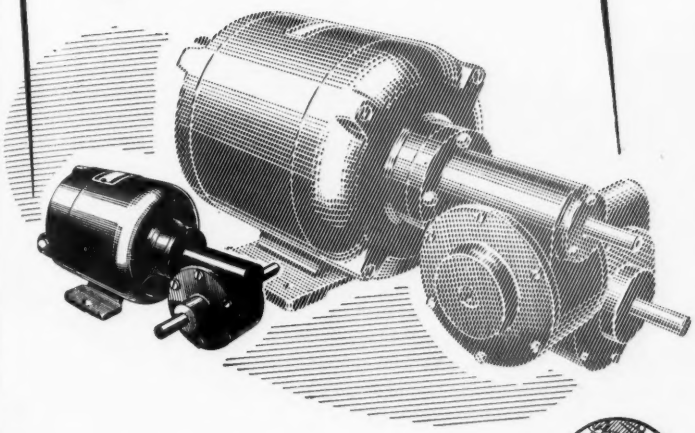

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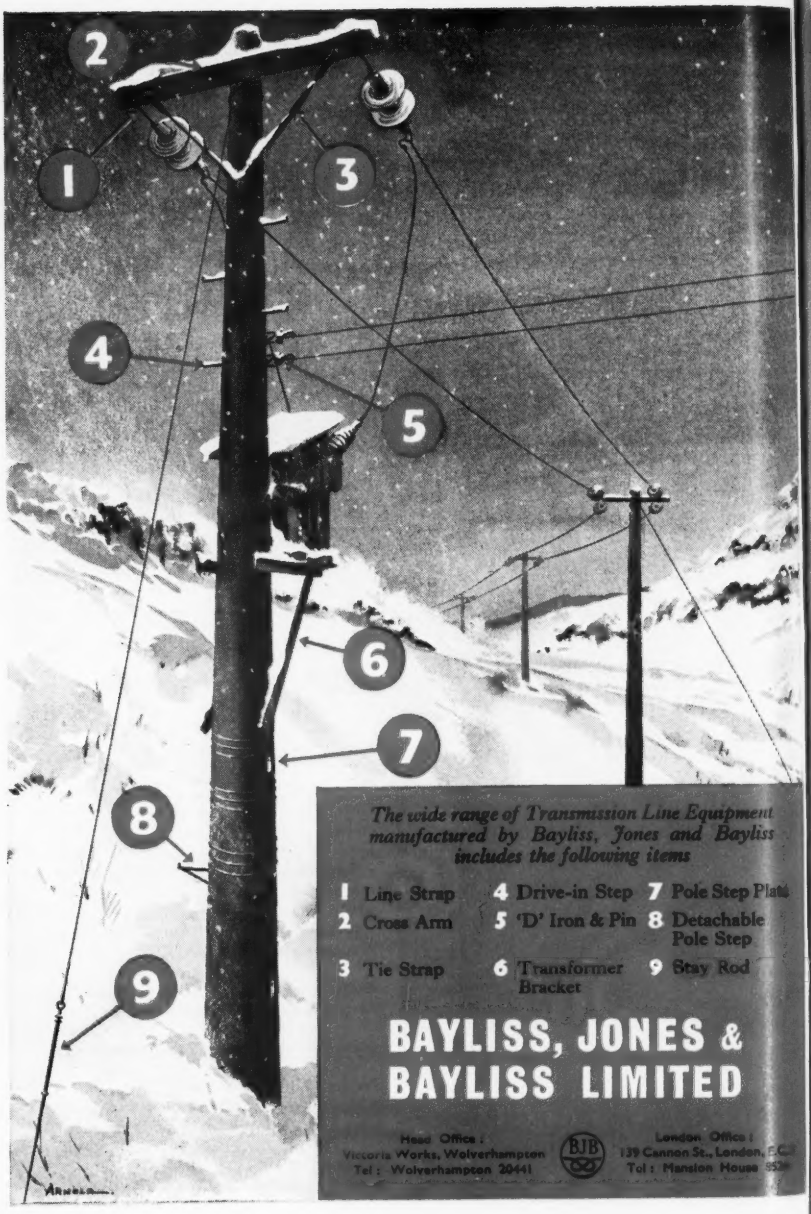
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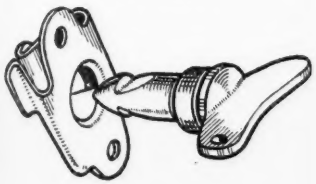

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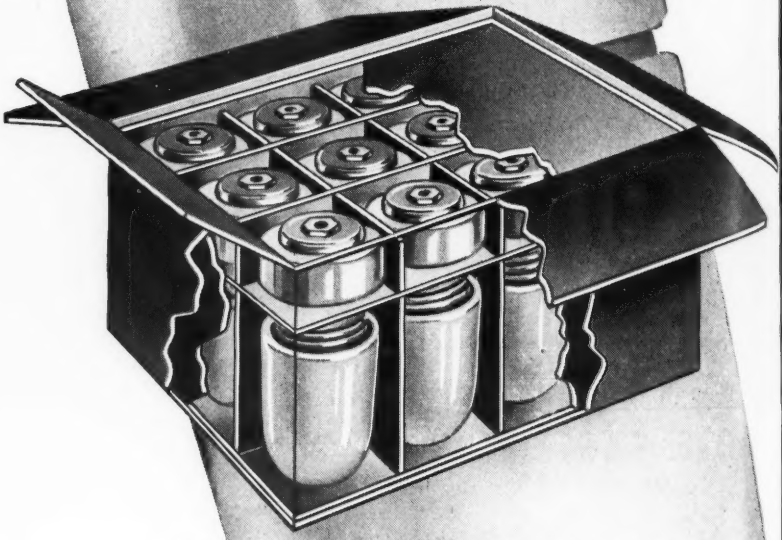

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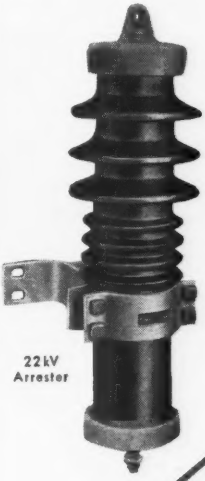

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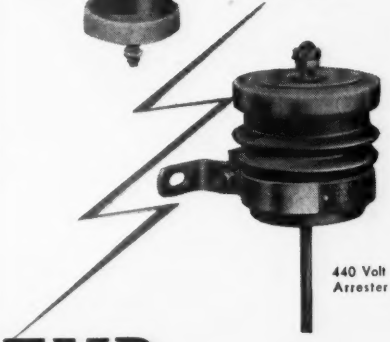

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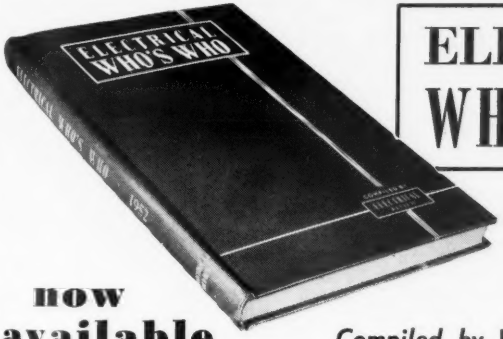

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1952 EDITION

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A comprehensive personal directory of men and women in prominent positions in the electrical profession and industry. Over 4,000 entries giving concise particulars of training, careers and activities.

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ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue, and should be addressed to Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

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SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

INDIA STORE DEPARTMENT

THE Director-General, India Store Department, 32/44, Edgware Road, London, W.2, invites tenders for the supply of—

Wireless Sets, No. 19, Mk. 3. Quantity 1489 Nos. Set Kit No. 3, V.A.O.S., Cat. No. ZA.12000/63.

Forms of tender, which are returnable by Friday, 30th January, 1953, may be purchased at the above address at a cost of ten shillings. Reference D.O.2656/51 must be quoted in all applications. 3150

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the Local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order, 1952.

OLDHAM EDUCATION COMMITTEE

Municipal Technical College

APPLICATIONS are invited for the following:—

(a) LECTURER IN THE MECHANICAL ENGINEERING DEPARTMENT to specialise in the development of higher courses in Production Engineering, including lecture and laboratory work in Technology, Metrology, Principles of Interchangeable Manufacture, Jig and Tool Design and advanced subjects of the C. & G. Machine Shop Engineering courses. Graduate qualifications essential, membership of the Institution of Production Engineers, and good industrial experience in tool room and production methods. Burnham Report salary, i.e., £940 × £25 to £1,040 per annum.

(b) ASSISTANT TEACHER (Grade B) in the Electrical Engineering Department. Graduate qualifications essential. Teaching experience and good industrial experience desirable. Burnham Report salaries, i.e., £490 × £25 to £765 per annum, with appropriate additions for training and degrees.

Further details of the posts and forms of application obtainable from the Director of Education, Education Offices, Union Street West, Oldham. 3143

LONDON ELECTRICITY BOARD

Junior Engineer, Operation and Maintenance Branch

APPLICATIONS are invited for the above position in the Hampstead District of the North Western Sub-Area. Applicants should have received a sound general and technical education at least to the Graduate I.E.E. standard. They should have completed an engineering apprenticeship with an electrical manufacturer or supply authority and should have sound practical experience in three-phase H.V. and L.V. distribution. The successful applicant will be required to participate in stand-by duties.

The post is graded under the National Joint Board Agreement as Class E, Grade 15, commencing salary £415 per annum inclusive, rising in accordance with Clause 35 to Grade 11, £458 to £470 per annum, inclusive of London allowance.

Application forms, obtainable from Establishments Officer, 46/47, New Broad Street, London, E.C.2, to be returned completed by 3rd January, 1953. Please enclose addressed foolscap envelope and quote ref. V/1554/R on all correspondence. 3151

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions in the Division:—

ASSISTANT SHIFT CHARGE ENGINEER, Staythorpe, Nr. Newark (Vacancy No. 104/52). Applicants should possess the Higher National Certificate or its equivalent and have had experience in a responsible position in a modern generating station.

The salary will be in accordance with Class J, Grade 9 (£719-£750 p.a.) of the National Joint Board Agreement.

Closing date for the above appointment, 5th January, 1953.

CIVIL ENGINEERING DRAUGHTSMEN, Construction Department, North Wilford (Vacancy No. 106/52). Candidates should have experience in design and detail of reinforced concrete structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., or general building construction, drainage and sanitation schemes, associated with offices and administrative buildings.

The salary will be in accordance with Grade 5 (£567-£671 p.a.) or Grade 6 (£433-£567 p.a.), Schedule D, of the National Joint Board Agreement, according to age and experience.

Closing date for the above appointment, 5th January, 1953.

The above positions will be pensionable under the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity House, Barker Gate, Nottingham, and returned to the undersigned. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller. 3148

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:—

Birmingham and District Sub-Area

SENIOR ASSISTANT ENGINEER required in the Commercial, Technical and Contracting Section at Birmingham. Duties involve control of the technical activities of the section, which prepares tenders for large contracts and schemes for consumers relating to all aspects of the utilisation of electricity in industrial, commercial and domestic fields. Experience in the control of apparatus repair workshops will be an advantage and technical qualifications desirable. Salary £1,300/£1,341 per annum (N.J.B. Grade N.4).

GENERAL ASSISTANT ENGINEER required in the Meter and Special Test Department. Extensive experience required in the testing of meters and instruments and construction of special testing equipment. Appropriate technical qualifications desirable. Salary £692/£716 per annum (N.J.B. Grade N.13).

Apply within 14 days, stating age, experience, salary and position, to Emil Braathen, Sub-Area Manager, Midlands Electricity Board, 14, Dale End, Birmingham, 4.

Central Gloucestershire Sub-Area

GENERAL ASSISTANT DISTRICT ENGINEER required in the Severn Vale District. Experience necessary in all branches of distribution work, including operation and maintenance of high and low voltage cables and overhead lines, substations, etc. Technical qualifications desirable. Salary £531/£547 per annum (N.J.B. Class D, Grade 10).

Apply within 14 days, stating age, experience, salary and position to Mr. D. Holt, Sub-Area Manager, Midlands Electricity Board, 126, London Road, Gloucester.

A. STEPHENS, Secretary. 3157

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the following positions: SECOND ASSISTANT ENGINEER (Substations), Transmission Dept., Divisional Headquarters (S/13.366). Candidates should have experience in the design, layout and installation of substations employing switchgear up to a working voltage of 275 kV and transformers up to 120 MVA capacity. Ability to negotiate and co-ordinate all technical and engineering matters associated with the installation of grid substations and to supervise site erection is essential. A knowledge of overhead line and underground cable work is necessary.

Applicants should be corporate members of a senior professional engineering institution or hold equivalent qualifications.

Salary N.J.B. AX/CX, Grade 2, £834/£1,025.

GENERAL ASSISTANT ENGINEERS. Transmission Sections (S/13.367). Applicants should have had experience in the operation and maintenance of a high-voltage system and should have preferably received a works training on high-voltage switchgear and transformers.

Candidates should be graduates of the I.E.E. or hold equivalent qualifications.

Salary N.J.B. AX/CX, Grade 8, £501/£675.

Application forms, obtainable from P. D. A. Oliver, Esq., Divisional Secretary, 111, High Street, Portsmouth, must be returned by 7th January, 1953. 3139

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Salary, including London allowance, and conditions of service in accordance with the N.J.B. Agreement.

THIRD ASSISTANT ENGINEER (Electrical), Generation (Construction) Department, Divisional Headquarters. Qualifications: Experience in construction department of large electrical manufacturing organisation, or in the design and layout of generating station electrical plant and cables, is essential. Applicants should hold the Higher National Certificate or exempting diploma. Salary, Schedule C, Class AX, Grade 5, within range £681 9s. to £829 10s., rising to ultimate maximum Class EX, £927 3s. p.a.

ASSISTANT ENGINEER (Electrical Maintenance), Lombard Road Generating Station. Qualifications: Experience in maintenance of E.H.T. and L.T. switchgear, rotary converters, alternators, motor generators and motors. Ability to plan work to a strict schedule and experience in control of labour essential. Technical qualifications to Higher National Certificate standard preferred. Salary, Schedule A, Class F, Grade 8 = £666 15s. p.a.

Applications must be made on form obtainable from Divisional Secretary, B.E.A., London Division, Generation House, Great Portland Street, London, W.1, and be returned within 14 days of this advertisement. 3159

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

BRIGHTON "B" POWER STATION: ASSISTANT ENGINEER (Mechanical Planning). Applicants, who should possess sound technical knowledge and be familiar with the operation of H.P. plant, will be responsible for the planning of mechanical maintenance and associated labour. Arrangements have been made with the local council whereby accommodation is available to those living at present in rented property. N.J.B. conditions of service, Class J, Grade 11, £639 per annum.

Applications on forms obtainable from Station Superintendent, Brighton Power Station, Portslade-by-Sea, Sussex, should arrive by 2nd January, 1953. 3127

UNIVERSITY OF BRISTOL

APPLICATIONS are invited for a LECTURESHIP (Grade II or III) in ELECTRICAL ENGINEERING. Salary scales £400 to £1,100 according to qualifications and experience, with F.S.S.U. benefits and family allowances. Candidates should have an honours degree and some relevant postgraduate experience. A power frequency engineer is required; and one interested in electrical measurements or machines would be preferred.

Further details may be obtained on request, and applications, including the names of three persons to whom reference may be made, should be sent within 2 weeks of the appearance of this advertisement to the Registrar, The University, Bristol, 8. 3082

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

Civil Engineering Draughtsmen, Construction Dept. Drawing Office, North Wilford Power Station

APPLICATIONS are invited for the position of CIVIL ENGINEERING DRAUGHTSMAN at North Wilford Power Station, Nottingham.

Candidates should have had experience in design and detail of reinforced concrete structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., or general building construction, drainage and sanitation schemes associated with offices and administrative buildings.

The salary will be in accordance with Grade 5 (£567-£671 p.a.) or Grade 6 (£433-£567 p.a.), according to age and experience, Schedule D of the National Joint Board Agreement.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and returned to the undersigned not later than 5th January, 1953. Please quote Vacancy No. 106/52.

L. F. JEFFREY,
Divisional Controller. 3158

SOUTHERN ELECTRICITY BOARD

Assistant Engineer (Maintenance)

READING District of No. 2 (Newbury) Sub-Area. Salary N.J.B., Class G, Grade 11 (£573/£596 per annum). N.J.B. conditions of service.

Qualifications required are an approved technical training and experience of similar works, including fault location.

Duties of the post will be to assist the Operation and Maintenance Engineer, principally with the operation and maintenance of the H.V. and L.V. overhead and underground distribution systems working at voltages up to 33,000, and to undertake minor mains construction work. Standby duties are involved.

The successful applicant will be required to contribute to the B.E.A. and Area Boards Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 7, Oxford Road, Newbury, Berks, and returned to him in envelopes suitably endorsed, not later than 5th January, 1953. 3152

GOVERNMENT OF BAHRAIN

Electrical Engineering Assistants (Two)

APPLICATIONS are invited for the above appointments with the Government of Bahrain, Persian Gulf. Candidates should be 22/27 years of age, unmarried, and technically qualified up to at least Ordinary National Certificate standard, with practical experience in the electrical installations and/or mains departments of a public electricity supply undertaking.

The salary offered is up to Rs.800/- per month according to experience (one rupee = 1s. 6d.) and contracts are for four years. Furnished bachelor quarters, medical attention, electricity and water are provided free. Leave is earned at the rate of 2½ months for each completed year of service, with two free return air passages during each 4-year contract, and there is a provident fund.

Applications, giving full particulars of age, training, qualifications and experience, should be forwarded by air mail to D. Brammer A.I.E.E., State Engineer, Government of Bahrain, Bahrain, Persian Gulf. 3160

CROWN AGENTS FOR THE COLONIES

ELECTRICAL FOREMAN required by the Government of Somaliland Protectorate for the Public Works Department for two tours of 12 to 15 months in the first instance. Commencing salary according to age, qualifications and experience in scale £688 rising to £793 (including cost-of-living allowance). No income tax at present. Free passages. Outfit allowance £30. Liberal leave on full salary. Candidates, under 35 years, must have served an apprenticeship to electrical engineering and have good experience in their trade covering work on H.V. and L.V. transmission and distribution, house wiring, wiring for motors and other equipment, and the repair and overhaul of alternators, motors, etc.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting on letter M.29717B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. 3126

POWER PLANT SHIFT CHARGE ENGINEERS REQUIRED

APPLICANTS should have served a recognised apprenticeship with a major engineering company and be able to produce evidence of a sound general and technical education. Experience of the following is desirable:—

(a) Work as a Shift Charge Engineer.
(b) High-pressure boiler and turbine operation.
(c) Operational control of an interconnected H.T. industrial network.
(d) Other works auxiliary services.

The salary for this position, which is permanent and pensionable, will be not less than £700 per annum, and will be according to age and experience.

Apply in writing to:—

The Personnel Superintendent
THE STEEL COMPANY OF WALES LIMITED
P.O. Box 3, Port Talbot

3083

BRITISH ELECTRICITY AUTHORITY

Midlands Division

SENIOR DRAUGHTSMEN are required in the mechanical engineering section of the Chief Generation Engineer's (Construction) Department at Wolverhampton. N.J.B. service conditions, superannuable appointments; salaries within Schedule D, Grade 4, £671 to £780, and Grade 5, £567 to £671.

Experience in the layout and design of generating stations or generating plant, including boilers, turbo-alternators and ancillary equipment required, together with Higher National Certificate in mechanical engineering or equivalent qualifications.

Apply on forms available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, to be returned by 10th January, 1953.

F. W. LAWTON.
Divisional Controller. 3145

BRITISH ELECTRICITY AUTHORITY

Midlands Division

JUNIOR ENGINEER is required at Walsall Generating Station. N.J.B. service conditions, superannuable appointment; salary within Schedule A, Class G, Grades 16 to 14, £390 to £473 per annum.

Applicants should preferably have had experience in a large generating station, and duties will consist mainly of switchboard operation. Ordinary National Certificate or an equivalent qualification an advantage.

Apply on forms available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, to be returned by 10th January, 1953.

F. W. LAWTON.
Divisional Controller. 3147

BRITISH ELECTRICITY AUTHORITY

Midlands Division

SHIFT CHARGE ENGINEER required at Stoke Generating Station. N.J.B. service conditions, superannuable appointment; salary within Schedule A, Grade E.7, commencing at £649 per annum.

Sound technical training and practical experience in the control and operation of steam generating plant and main switchgear, or mechanical and electrical experience in a manufacturer's works. Qualified marine engineers with electrical experience will receive consideration.

Apply on forms available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, to be returned by 10th January, 1953.

F. W. LAWTON.
Divisional Controller. 3146

APPOINTMENT IN CANADA FOR GENERAL MANAGER, TRANSFORMER FACTORY

TOP EXECUTIVE required for proposed Transformer Factory in Canada, operating as subsidiary to established British company. Applicants should be experienced in the design and production of power transformers up to 30 MVA, 88 kV, and also have ability to take over all the responsibilities of General Manager. Remuneration will start at a good level with excellent growth prospects as the company develops. Assistance given in housing. Applications will be treated in confidence and should be addressed to—Box 3128.

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

SHIFT CHARGE ENGINEER, Littlebrook Power Station (480 MW). Applicants should hold an engineering degree or be Corporate Members of the Institution of Electrical Engineers and/or Institution of Mechanical Engineers and have had extensive experience in the operation of modern high-pressure turbine and boiler plant and E.H.T. switchgear. Considerable experience in administration and in the control of labour essential. Preference will be given to those with P.F. experience. Assistance with housing accommodation may be possible for those living at present in rented property. N.J.B. conditions of service, Class M, Grade 7, £1,035 6s. p.a., including London allowance.

Applications on forms obtainable from Station Superintendent, Littlebrook Power Station, near Dartford, Kent, to be received by 5th January, 1953. 3144

A LEADING firm of manufacturing electrical engineers requires a drawing office section leader experienced in the development mechanical design of electrical rotating machinery up to 1,500 h.p. The office is located in the S.W. London area and the work is of exceptional interest. The working conditions offered are most favourable and the appointment will command an outstanding salary, depending upon the qualifications of the successful candidate. Full details to—Box 3074.

A PROMINENT firm of manufacturing electrical engineers is offering unusually favourable salaries and working conditions to senior draughtsmen for work on development and mechanical design of electrical machinery 5-1,500 h.p. The office is located in the S.W. London area and the work is of exceptional interest. Full details to—Box 3075.

A VACANCY exists for a qualified sales engineer as the London representative of a well-known company manufacturing electrical rotating machines (1-100 h.p.). Candidates must have had successful experience in the hard school of selling. Salary commensurate with qualifications and experience.—Box 3153.

A WELL-known firm of electrical insulation manufacturers in East Lancashire requires works manager. Applicant must be an electrical engineer with technical qualifications and have general knowledge of the insulation trade. Please state age, qualifications and salary required in strictest confidence.—Box 3092.

ALLIED IRONFOUNDERS Limited invite applications for appointment as engineer for new centrifugal casting plant. Engineering degree or H.N.C., Mech.E. and E.E. Preferably Graduate or Corporate Member of I.Mech.E. or I.E.E. Drawing office and practical engineering experience essential. Pension scheme. House will be made available. Apply to—Allied Ironfounders Ltd., Spinning Plant, Ketley, Wellington, Shropshire. 3113

ARMATURE winder, experienced in fractional horse-power motors. Knowledge of workshop practice.—Electro-Mechanical Repairs (Cornwall) Ltd., 94, Pydar Street, Truro (Phone 2242). 3129

ASSISTANT electrical engineer, South Wales; workshop experience; degree not essential. Write—Box 928, c/o Walter Judd Ltd., 47, Gresham St., London, E.C.2. 3130

CHAMBERLAIN & HOOKHAM, New Bartholomew Street, Birmingham, invite applications for appointment of designer of electrical protective relays and other similar devices. Applications should state age, experience, qualifications and salary required. 3131

COOKE & FERGUSON Limited, switchgear specialists, require a chief research engineer with first-class technical qualifications (degree or H.N.C.) and practical experience of high-voltage switchgear design and testing. Applicants should be capable of supervising technical work of a varied nature and should have specialised experience in several of the following subjects: H.V. bushing manufacture; insulation material and processes; high-voltage testing technique; thermal calculations; instrument transformer design; protection of electrical circuits; short circuit testing of switchgear. The position offered is of senior responsibility and a commensurate salary will be offered. Applications, with full details of age, qualifications and experience, should be addressed to—Victoria Street, Openshaw, Manchester, 11. 3001

COOKE & FERGUSON Limited, switchgear specialists, require a technical sales engineer who has served a recognised apprenticeship in switchgear and has first-class knowledge of the application of modern systems of protection, and preferably has also good experience in the design of instrument transformers. Preference will be given to applicants who have qualifications leading to Corporate Membership of the Institution of Electrical Engineers. Apply, with details of age, qualifications and salary, to—Victoria St., Openshaw, Manchester, 11. 2999

COOKE & FERGUSON Limited, switchgear specialists, require a senior designer/draughtsman for work of an interesting and varied nature. Applicants must have good technical qualifications (H.N.C. or equivalent), and experience of high-voltage switchgear. Preference will be given to applicants who have served a recognised apprenticeship in switchgear. Apply with full details to—Victoria Street, Openshaw, Manchester, 11. 3000

DOMESTIC cooker demonstrator required by British National Electrics Ltd. for Northern England and Scottish areas. Applicants should preferably hold a Domestic Science Certificate and the E.A.W. Housecraft Certificate. Experience in the electrical industry is an advantage and applicants must be prepared to travel. Salary will be in accordance with training and experience. Apply in writing, giving full details, to—Employment & Welfare Manager, Johnson & Phillips Ltd., Charlton, London, S.E.7. 3132

DRAUGHTSMAN, electrical, with experience of A.C. and D.C. automatic motor control gear. Manchester district. State qualifications and salary required—Box 3093

DRAUGHTSMAN, junior, preferably with knowledge of electrical installations. Write details of experience, age and salary required to—The Phœnix Electrical Co. (London) Ltd., 16/18 Marshalsea Rd., London S.E.1 3154

DRAUGHTSMAN required for a factory in Enfield district with experience in the design and manufacture of domestic appliances preferred. Please reply, stating age, experience in chronological order, and salary required, to—Box 3133.

DRAUGHTSMEN required with experience of light electro-mechanical devices for interesting new development and production drawing office work on domestic appliances and television receivers. Good opportunities for men with imagination and initiative in expanding department of large modern works on Merseyside. Housing assistance available for selected applicants. Reply, quoting Ref. AJEE, to Box 2866, giving details of age, experience and present occupation.

ELECTRIC fitter or winder-fitter required, used to breakdown work and lifts. Apply—Tenjay Engineering Limited, 39/44, Cowper St., London, E.C.2. 8844

ELECTRICAL draughtsman required for interesting development work in engineering services development division. Applicants should be under 28 years of age and have experience of industrial electrical power and lighting layout and design. Pension scheme. Write, stating experience and salary required, to—Personnel Manager, Ferodo Ltd., Chapel-en-le-Frith, Via Stockport, Cheshire. 3161

ELECTRICAL engineer required, familiar design and planning all types electrical installation and layouts; salary according to experience. Apply—T. P. Bennett & Son, 43, Bloomsbury Square, London, W.C.1 (Tel. No. Langham 6371). 3019

ELECTRICIAN/wiremen required; permanency to fully experienced applicants if suitable. London rates paid. —J. W. Russell, 18, Queen's Road, Watford. 3018

ENGINEER or competent foreman required for extensive electrical construction contracts, including underground cables. Permanent employment. Details, please, to—Box 3086.

ESTIMATOR (junior) required by electrical manufacturers dealing with specialised motors and generators. Preferably with test bed experience. London district. State experience, age and salary required.—Box 3045.

GEORGETOWN, Demerara, B.G. Public utility requires mechanical superintendent for 12,000-kW steam power station. Particulars from—Box 8846.

HIGH-voltage system planning engineers. Candidates should be under 30 years old and have a first class honours degree in electrical or mechanical engineering. Salary £450 to £750 according to experience. Apply—Kennedy & Donkin, 12 Caxton St., London, S.W.1. 3134

JOHNSON & PHILLIPS Ltd. have vacancies for sales engineers in London, Glasgow and South Wales, and would like to receive applications from experienced and qualified men who are used to dealing with the sales of any or all of the following products: Cables of all types, switchgear, transformers and power factor correction capacitors. For these vacancies preference will be given to men who have had a few years' outside sales experience and are in the 30/35 age group. Applications, with full particulars as to experience, technical background and salary classification, should be sent to—The Employment & Welfare Manager, Johnson & Phillips Ltd., Victoria Way, Charlton, London, S.E.7. 3155

JOHNSON & PHILLIPS Ltd. require a sales engineer for South-west Scotland. Applications in writing, stating age, training and experience, should be addressed to—The Manager, Johnson & Phillips Ltd., 106, Hope Street, Glasgow, C.2. 3135

JOINTERS and jointers' mates required for telephone cable contracts. Good wages, out allowance and pension scheme. Apply in writing to—Telecommunications Dept., Pirelli-General Cable Works Ltd., Eastleigh, Near Southampton. 248

MAINTENANCE electrician, non-resident. Experienced in maintenance repair work for electric lifts. Central London and district; 44-hour week. Reply, stating experience, to—Box 3136.

MANUFACTURING electrical engineers require draughtsman with general experience electrical engineering. Interesting and varied work. — A.E.W. Ltd., Imperial Works, Edgware, Middx. 3162

PILKINGTON BROTHERS Limited, glass manufacturers, require assistant electrical engineer (not over 27 years of age) for large electrical plants in the North of England. The field covers the design, construction and maintenance of heavy electrical installations, and also electrical development, instrumentation and automatic control (including electronic) of new and existing processes. Applicants should possess a university degree in electrical engineering, should be Graduates of the Institution of Electrical Engineers, and should have at least two years' practical experience. Salary according to age and qualifications. Applications should be addressed to—The Chief Personnel Officer, Pilkington Brothers Limited, St. Helens, Lancashire. 3156

SENIOR transformer engineer is required by an old-established electrical manufacturer to take charge of a section designing power transformers up to 10,000 kVA at voltages up to 66 kV in a new factory in the North-West. Applicants should be graduates of a British university, Corporate Members of the Institution of Electrical Engineers, and experienced in all the latest techniques of transformer engineering, including impulse testing. Arrangements will be made for satisfactorily housing the successful applicant. Please write, quoting ref. GBE, to —Box 3163.

SMART & BROWN (ENGINEERS) Ltd. are about to extend their plastic division. Excellent prospects available for the right man possessing first-class connections with ability to handle separate sales staff. Reply to —E.O.P. c/o Smart & Brown (Engineers) Ltd., 8, Rose & Crown Yard, King St., St. James's, London, S.W.1. 3142

STURTEVANT ENGINEERING Company Limited, Southern House, Cannon Street, London, E.C.4, have a vacancy for a fully qualified senior contracts engineer in their crushing department. Applicants for this post must have a fairly wide experience in chemical plant, crushing and grinding machinery and mechanical handling equipment; knowledge of fertilisers and lime hydrating an advantage. Applications must be made in writing, giving full particulars of education, age, experience and salary required. Copies of recent testimonials should be sent with application. 3171

THE STARS AND STRIPES, an English language newspaper in the U.S. Zone of Germany, has an immediate opening for an electrical engineer to assume responsibility of the power plant system and supervise five (5) German electricians. Requirements: practical knowledge and experience in low-voltage distribution, installation and maintenance; diesel-driven generators; underground cable distribution systems; standard installation practices, and ability to read blueprints and wiring diagrams of machines and equipment peculiar to the printing trade. A knowledge of the German language will be an asset. Single man preferred, age 28-40. Reply in confidence to—The Stars and Stripes, A.P.O. 175, U.S. Army. 3166

TRANSFORMER test engineer with practical experience required. Good salary and prospects. Apply, stating age, experience and qualifications, to—Brentford Transformers Limited, Kidbrooke Park Road, London, S.E.3 (Tel. Lee Green 1006/8). 3098

VERY live manufacturer of non-association cables, electrical mouldings and other products with a household name, requires the services of a live-wire London sales manager. The man required must be a first-class salesman used to dealing with tough wholesalers at top level. He must be able to obtain business and see that his staff do likewise. Also must be capable of running efficiently a depot doing a million pounds a year turnover. If there is such a man we should be glad to have immediate applications for the job which carries a four-figure salary. Interviews in London in the near future. Box 3053.

WORKS manager, miniature electric lamp works near London. Fully qualified and experienced in mass production all kinds of low-voltage lamps on modern machinery, particularly automatic bead mounting. Must be able to take complete charge. Remunerative position. Newly built 4-bedroom house available rent free. State age, education, remuneration required.—Box 316..

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X-RAY sales engineer required for S. Africa. Practical knowledge of X-ray apparatus essential. The position is permanent and offers good scope after a period of training in England. Vacancies also occur in England and Scotland for engineers with similar qualifications. Apply in writing to—Watson & Sons (Electro-Medical) Ltd., East Lane, North Wembley. 3140

YOUNG electrical engineer wanted for assisting with modern road traffic signal engineering, development, circuit design and testing. This offers interesting work with telecommunication type components and practice. Higher National Certificate or equivalent, and preferably having completed national service. £400-£550 p.a. according to age, qualifications and experience. Apply—Chief Engineer, The Siemens and General Electric Railway Signal Co. Ltd., East Lane, Wembley. 3165

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

STEIN & ATKINSON Ltd.—Assistant electrical engineer. All applicants are thanked.

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DRAUGHTSMAN, contactor switchgear, wiring diagrams, 20 years with large Manchester firm, seeks position in Somerset convenient to Taunton/Bridgwater.—Box 8824.

EXPERIENCED representative, own car and excellent connection London, Home Counties among wholesale contractors, Boards, seeks position with progressive manufacturer.—Box 8845.

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STEAM-DRIVEN GENERATING PLANT

500 kW. 625-kVA Steam Set comprising vert., encl. compound 2-crank Steam Engine by BROWETT LINDLEY, cylinders 23" × 32½" × 15" stroke, 165 lb. sq. in., 15 lb. back pressure. Direct driven Alternator by L.D.C., 440/3/50, 333 r.p.m., with exciter and switchgear.

250-kW Steam Engine-driven Generator Set, 400 volts D.C., 3-wire, 625 amps., 375 r.p.m., with 365-b.h.p. BELLISS & MORCOM Engine. Steam pressure 180/195 lb. sq. in., exhausting to 60 lb. back pressure, with oil-free exhaust. Cylinders 11" × 11" × 9".

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1,000 kW Turbo-Alternator Set by WESTINGHOUSE, 400/440/3/50. Steam pressure 200 lb. sq. in., 3,000 r.p.m. Exhausting to Surface Condenser.

3 BABCOCK & WILCOX Boilers, each approx. 25,000 lb. evap., 200 lb. pressure, for saturated steam, with Economisers, Chain Grate Stokers, two Boiler Feed Pumps. HOPKINSON fittings.

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300-h.p. VERTICAL FIVE-CYL. COLD-STARTING DIESEL ENGINE, speed 600 r.p.m.; cyls. 10½" bore × 12" stroke; 4-stroke cycle; tachometer, gauge, etc.

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71-h.p. VERTICAL SIX-CYL. RADIATOR-COOLED COLD-STARTING by FOWLER, type 6B, speed 1,300 r.p.m.; cyl. 4½" bore × 6½" stroke; fuel tank, water circulating pump, air filter, radiator, flywheel 24" × 4½" face, etc.

57/60-h.p. VERTICAL SIX-CYL. FOUR-STROKE CYCLE by R. A. LISTER, type 6/6, 1,000 r.p.m.; cylinders 4½" × 5½" stroke; electric start, 24-volt battery; quantity of spares, comprising valves, springs, bearings, etc., all unused and in first-class condition.

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40-h.p. VERTICAL FOUR-CYL. WATER-COOLED COLD-STARTING by SOUTHERN CROSS, speed 1,150 r.p.m.; flywheel 22" dia. × 4½" face; air filters, fuel pumps, water circulating pump, fuel tank, etc.

30-h.p. TURNER VERTICAL FOUR-CYLINDER RADIATOR-COOLED, speed 1,500 r.p.m.; flywheel 17" dia. × 6" face, pulley 9" dia. × 10" face, fuel tank, etc.

20-h.p. VERTICAL TWIN-CYL. WATER-COOLED COLD-STARTING by SOUTHERN CROSS, speed 1,200 r.p.m.; flywheel approx. 20" dia. × 4½" face; air filters, fuel pumps, fuel tanks, etc.

18-h.p. UNUSED NATIONAL TYPE DA2 VERTICAL TWIN-CYLINDER, speed 1,000 r.p.m., complete with radiators, circulating pump, governor, etc.

18-b.h.p. HORIZONTAL SINGLE-CYL. OIL ENGINE by BLACKSTONE, type OPH, 540 r.p.m.; twin flywheels 4½" face × 35" dia.; flat pulley, etc.

10-b.h.p. PETTER TYPE AV2 VERTICAL TWIN-CYLINDER, speed 1,500 r.p.m., complete with fuel tank, air filter.

10-b.h.p. CROSSLEY VERTICAL SINGLE-CYL. RADIATOR-COOLED DIESEL ENGINES, speed 1,500 r.p.m. Type BV, 8 h.p. at 1,250 r.p.m.

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East Midlands Division

THE BRITISH ELECTRICITY AUTHORITY invites tenders for the removal of scrap plant at the Northampton Power Station. The plant includes three Turbo-Alternators, and Condensers with auxiliaries, and four stoker-fired Water Tube Boilers.

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Tenders are to be delivered to the Chief Generation Engineer (Construction) not later than 12 noon on Friday, 30th January, 1953. 3149

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25,000 B. & W. CTM type Boiler, 190 lb., Superheater, Economiser.

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30' × 8' 6" Lancashire Boiler by YATES & THOM, 160 lb.

COCHRAN, ECONOMIC, Vertical Boilers in stock.

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TV WITHOUT MAINS. Picture equal to mains supply. Special Chorehorse AC/DC PETROL ELECTRIC GENERATORS, self-starting, self-contained, compact, A.C. voltage 220/250, 50/60 cycles, 250/350 watts. Will also run Radios, Vacuum Cleaners, Small Tools, etc. D.C. output will charge batteries for permanent lighting. Price £47 10s. plus 10s. delivery.

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Finest possible specification, dry, uncharged.

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D.C. MOTORS, FANS, etc. Mains voltage, ¼ to 10 h.p. Approx. 75% below list.

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Dept. "O," High Street, Teddington, Middx.
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TWO ROTARY CONVERTERS FOR IMMEDIATE SALE

4 kW D.C. input, A.C. output. 50 cycles, 230 volts. Perfect condition and open for inspection on site. Best offers to:—

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A BABCOCK & Wilcox water-tube boiler will cut down your fuel costs; we can supply from stock. Two 50,000lb. evap., 310lb. w.p.; two 40,000lb. evap., 200 lb. w.p.; two 25,000 lb. evap., 250 lb. w.p.; two 16,000 lb. evap., 190 lb. w.p.; also marine, Cornish, vertical, etc. We install complete, including brickwork.—Burford, Taylor & Co. Ltd., Boiler Specialists, Commercial Street, Middlesbrough (Tel. Middlesbrough 2622). 32

A BARGAIN in electric motors can always be obtained from A. Cooksley & Co. Ltd., 21-35, Tabernacle St., London, E.C.2. Tel. Monarch 3357. Stocks at present comprise new squirrel cage motors, 1-25 h.p., also new and secondhand slipring motors, with starters, from 7½ b.h.p. to 30 b.h.p. 50

A.C. and D.C. house service meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one yr. Repairs and recalibrations. — The Victa Electrical Co., 47, Battersea High St., S.W.11 (Tel. Battersea 0780). 138

A.C. and D.C. motors, all sizes, large stocks, fully guaranteed. — Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). 102

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

ALTERNATORS, 4 28-kVA, 400/3/50, Cromp. Park., 1,500 r.p.m., as new with A.V.R., etc.; also 2 9-kVA, 230/1/50 B.T.H., 1,500 r.p.m.—J. S. Ramsbottom & Co. Ltd., Keighley. 68

BALL bearings all types supplied ex stock.—Huth & Co., 3, Victoria Street, London, S.W.1 (Abbey 7481). 222

BUILDERS' pole ladders from well-grown Norwegian spars now in production. Also all sizes steps, trestles, telescopic trestles, push-up and rope-operated extension ladders. Write, phone or call—Shaftesbury Ladders Ltd., 453, Katherine Road, London, E.7 (Phone, Grangewood 3363/4). 15

CABLE, all types, most sizes, up to .5 sq. in in stock.—J. S. Ramsbottom & Co. Ltd., Keighley. 45

CONDUIT, ex stock against licence or S.Q.E. Certificate. Close joint or welded, also conduit fittings, cable, etc. —Bertford Manufacturing & Supply Co., Marklands Works, Horwich, Lancs (Telephone, Bolton 8093). 133

CROMPTON Parkinson 125-h.p., 400-volt, 3-phase, 50-cycle slipring, screen-protected motor with Allen West oil-immersed rotor stator starter.—C. J. Ferguson & Sons Ltd., 33, Barbican, London, E.C.1 (Monarch 5474/5). 105

DIESEL electric plants, from 3-20-kVA output, with remote push-button control and automatic voltage control; prompt delivery; 3-kVA pattern with Petter engine, £255.—Ward, Lordscroft Works, Haverhill, Suffolk (Tel. 253). 167

DIESEL generating set, McLaren/Brush, 55 kW, 440-230/3/50, rubber mounted, 2 switches included if required. Purchased new November 1951. Total running hours to date, 30 hours. Apply—Industrial Insulations Limited, Shefford, Beds. 313

DIESEL generating sets, English manufacture, direct current, all voltages, from 50 kW to 260 kW.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 158

DIESEL generating sets, English manufacture, 3-phase, all sizes from 50 kW to 260 kW.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 157

ELECTRIC motors, generators, control gear, transformers, A.C. and D.C., new and reconditioned; all covered with our usual 12 months' guarantee; large stocks available. — Electropower Co. Ltd., Kingsbury Works, Kingsbury Rd., London, N.W.9 (Colindale 4621-2). 42

ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 13

ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed. Copy of our Register, "Electrical Surplus," containing thousands of items of electrical plant, sent on request. — R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 34

FOR sale, 550 plug sockets and tops, Crabtree 8661, 15-amp., 3-pin, flush, complete with iron box and polished brass plate, double-pole switch, non-interlocking type; 350 2-amp., 3-pin plug tops, Crabtree 7010; 200 5-amp., 3-pin plug tops, Crabtree 7118; 250 15-amp., 3-pin, 5-amp. fused plug tops, Crabtree 7218. Further particulars from—Box 3077.

GEARED motors, new. From stock or quick delivery. Any h.p. or speed.—Super Power Ltd., 81, North Side, Clapham Common, London, S.W.4 (Battersea 3355). 246

GENERATING sets. New Powerco diesel plants, hand start or automatic, complete and self-contained standard range from 3 to 25 kVA, stationary or mobile. Separate generators, alternators, etc., ex stock, all types. Lists free. — Powerco Ltd., Wandsworth Town Station, York Road, London, S.W.18 (Vandyke 5234). 153

GENERATING sets, petrol engine-driven alternators, 220/240 volts, single-phase and 3-phase.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 160

GENERATING sets, petrol engine-driven dynamos, 110 volts and 220-240 volts, direct current.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 159

HOTRIC replacement elements, for storage and immersion heaters, pyrex inner containers, joints, swivel outlet arms, gaskets, etc. Complete reconditioning of all types of electric storage water heaters.—W. F. Davis (Engrs.), 1, Lordship Lane, Tottenham, London, N.17 (Telephone: TOT. 9620). 246

HOUSE service meters, C. & H., Aron, E.A.C., 20-240 v. A.C., s.-ph., 50 c., 2½ amps., 7s. 6d. each. 1s. 6d. postage; 5 amps., 17s. 6d.—Universal Electrical, 217-221 City Road, London, E.C.1. 129

IMMEDIATE delivery new 330-kVA, 400-volt, 3-phase, 50-cycle, 4-wire B.T.H. alternator direct coupled to 400-h.p. Paxman diesel engine, 1,000 r.p.m., complete with switchboard and A.V.R. control.—C. J. Ferguson & Sons Ltd., 33, Barbican, London, E.C.1 (Monarch 5474/5). 104

LAMPS, new E.L.M.A., 18,000 from 15 to 150 watts, 50 to 250 volts, E.S. & B.C. from 59s. per 100.—J. S. Ramsbottom & Co. Ltd., Keighley. 44

M.K. 5-amp., 3-pin, anti-flash watertight plugs and sockets, brand new, ex stock. — Ryness Ltd., 178, Stamford Hill, London, N.16. 8833

MERCURY switches are made by Hall, Drysdale & Co. Ltd., of 58, Commerce Road, Wood Green, London, N.22 (Tel. Bow 7221). 182

METERS, A.C./D.C., quarterly or slot.—Brent Electrical Co., 6, Holmdale Gardens, London, N.W.6. 131

MOTOR converters and motor generators, unused, 110 or 220 v. D.C., 230/1/50, 0.3 to 6 kVA, from £15; also generators, alternators, etc. Lists free.—Powerco, Wandsworth Town Station, York Road, London, S.W.18 (Tel. VAN. 5234). 149

NAMEPLATES, engraving, diesinking, stencils.—Stillwell & Sons Ltd., 153, Far Gosford St., Coventry. 14

MOTOR generator sets and converters, all sizes and voltages from ½ kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Rd., London, N.1 (Tel. Clerkenwell 5512, 5513 & 5514). 28

NIFE "Neverfayle" lighting set for 230 volts A.C. supply, output 50 volts, 80 amp. hours.—J. S. Ramsbottom & Co. Ltd., Keighley. 67

PETTER air-cooled, petrol-driven, fully automatic lighting set, capacity 2½ kilowatts at 110 volts D.C., complete with 52-cell battery by Pritchett & Gold. All new October, 1948. Can be seen in good running order. Write —13X6, Wm. Porteous & Co., Glasgow. 8847

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PREPAYMENT 1s. slot house service meters.—Universal Electrical, 217-221, City Rd., London, E.C.1. 56

PURLEY chokes and ballasts. Our 80-w. tapped h.p.f. ballast with starter switch-holder incorporated is proving itself the most popular unit. Suitable for most fittings 57s. 6d. each subject.—F. W. Bianshard Ltd. (Dept. ER), Purley, Surrey (Uplands 4818/9). 52

ROTARY convertor, 480 D.C. input, 230 A.C. output, in good working order and fully maintained; also 20-amp. D.C. battery charging board and several small D.C. motors. For full details phone—S. Bowley & Son Ltd., London, S.W.11 (BAT. 1048, extension 7). 3101

ROTARY convertors in stock, all sizes, enquiries invited.—Universal Electrical, 221, City Road, London, E.C.1. 16

SLYDLOK fuses and English Electric H.R.C. fuses, ex stock.—Ryness Ltd., 178, Stamford Hill, London, N.16. 8835

SMALL stainless steel screws and nuts up to and including ¼" Whitworth.—The Premier Screw & Repetition Co. Ltd., Woodgate, Leicester 180

TRANSFORMERS, 230/115/1/50 double wound, 10 kVA, £29; 15 kVA, £35; 5 kVA, 400/200/3/50 double wound, £29; 30 kVA, 400/200/3/50, £69; 50 kVA, 9,000/220/3/50 double wound, £95; 200 kVA, 400/200/3/50 double wound, £195. Lists free.—Powerco Ltd., Wandsworth Town Station, York Road, London, S.W.18 (Van. 5234). 152

VENNER time switches, 200-240 v. A.C./D.C., 10/20 amps., 90s. each.—Universal Electrical Co., 221, City Road, London, E.C.1. 202

WARD Leonard motor generator sets, all sizes.—Britannia Manufacturing Co. Ltd. 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

WATERTIGHT switches, ironclad, 5 amps., brand new, silver finished, MK Catalogue No. 3750, disc operated, 8s. each net, ex stock.—Ryness Ltd., 178, Stamford Hill, London, N.16. 8834

WEE Meggers, 500 v. Fine condition, 8 gns.: Record testers, 500 v., £8.—Parfect, 142, Swithland Lane, Rothley, Leics. 8829

WELDING dynamos and welding sets for sale.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 11

27 yds. .5 4-core P.I.L.C. D.S.T.A. & served new 660-volt cable.—E. M. Tatton & Co. Ltd., Kew Bridge, Brentford (EAL. 3155/6). 3168

80 PHILIPS Philora 400-w. mercury chokes complete in watertight cases incorporating 20-mf. B.I. condenser, complete, £2 each, ex works.—Ryness Ltd., 178, Stamford Hill, London, N.16. 8832

120 amp., 6-way T.R.N. Revo dis. boards, galvanized, brand new, 9 at £19 each.—J. S. Ramsbottom & Co. Ltd., Keighley. 66

625 RLM dispersive reflectors, 12" dia. × 1¾" hole, without lampholders. G.E.C. Catalogue No. F.60047, for 60/75-watt lamps; 47 elliptical angles reflectors, 13" × 9¾", G.E.C. Catalogue No. F.16218, for 60/75-watt lamps; 5½ gross 2-plate porcelain ceiling roses, surface type (new and unused). Catalogue A.392 Tucker. Apply—Patons & Baldwins Ltd., Kilncraigs Factory, Alloa. 3169

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COPPER wire, enamelled and synthetic, cotton, silk, paper-covered wtd. for spot cash.—Porchester Electrical, 15/16 Gerrard St., London, W.1 (GER. 7676). 79

DIESEL engines or diesel-driven generator sets, 100 kW up to 400 kW, slow speed preferred. — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 53

NICKELCHROME wire wanted. Prompt cash.—Porchester Electrical Supply Company Limited, 15/16, Gerrard Street, London, W.1 (GER. 7676). 78

SURPLUS laminations, enamel copper wire, scrap transformers, screws, nuts, flex. Good prices paid. Full details to—Box 8795.

WANTED, D.C. and A.C. ball-bearing motors, motor generator sets, dynamos and alternators. Full details to—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 29

WANTED for prompt cash, ferrous and non-ferrous scrap, also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. & H. Cooper Ltd., 176, Brady Street, Bethnal Green, E.1. 24

WANTED, rotary converters, any size. — Universal, 221, City Road, London, E.C.1. 22

WANTED: One motor generator set consisting of shunt wound D.C. generator, 60 volts, 500 amps., with exciter, and direct coupled on common bedplate to 415-volt, 3-phase, 50-cycle motor. Motor starter and control gear also required. Canning C.P. or C.W. type preferred. —Tungstone Products Ltd., Market Harborough. 3014

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have capacity for brass, gunmetal and soft grey iron machine moulded repetition castings weighing 1-30 lb. loose pattern work up to 3 cwt.; delivery by road to all parts.

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DO you want something made in quantity? If it is a metal pressing or assembled component, we can offer you the factory space and manufacturing "know-how." Send us your enquiries.—Metal Components Ltd., Dolphin Rd., Shoreham, Sussex (Tel. Shoreham 2224-5). 74

ELECTRIC motors, stators, etc., repaired and rewound. Vacuum cleaner and electric tools rewound. Seven-day service. — The Motor Winding Co., 18, Gipsy Hill, London, S.E.19 (Gipsy Hill 0354). 71

METALWORK. All types cabinets, chassis, racks, etc. to your own specifications. Write — Dept. 'S.' Philpott's Metal Works Ltd., Chapman Street, Loughborough. 211

PRECISION cabinet work. Capacity for high-grade "purpose made" wooden cabinets, instrument cases, control and log desks to your requirements. Singles or quantity.—Clifford & Snell Ltd., Sutton, Surrey (Vigilant 2255). 8643

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AGENCIES required by long-established firm of manufacturers' agents with large sales organisation covering the whole of Great Britain for conduit, conduit fittings, cables and flexibles, fans or any lines suitable for distribution to wholesalers; commission or buying basis.—Box 64.

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FREEHOLD plot, industrial, 14 × 120 ft., Greenwich (London) main road, and 2 Ministry concrete hut frames, with drawings for erection, each 60 × 25 × 13 ft., consisting of columns, purlins, etc. The lot, £580.—Box 3138.

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COMPANY MEETING

Copy can be accepted up to first post on Monday of the week of issue.

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AERIALITE LIMITED

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Mr. L. S. Hargreaves' Statement

THE Twentieth Ordinary General Meeting of Aerialite Ltd. was held on 17th December at Stalybridge, Mr. L. S. Hargreaves (chairman and managing director) presiding.

The following is an extract from his circulated statement:—

I have another successful year to report, with an increased turnover of 25%. The profit before taxation is up 12% on last year. I feel that this steady increase of 25% to 30% in turnover and the steady increase in profit figures are something of which we should be proud. Especially does this apply in this year because this year has been a very difficult one—many fluctuations in price, mainly downwards, have occurred, stock losses have had to be carried, and I feel that we have achieved a really satisfactory result in all the circumstances.

Taxation

It really is useless to consider profits, so called, before the tax man has taken the major portion of it, and so when looking at the figures we had better look at what is left, as taxation is taking 61.3% of our profit excluding E.P.L. I feel that this situation must be continually brought to the attention of the authorities as we are in the extraordinary position in this country that the harder we work, the more efficient we become, and the worse off we actually get. This is true of all British industry to-day because the tax man is at the throats of our businesses taking his toll in cash which is urgently needed to finance progress and development. We hear vague suggestions by the Chancellor of the Exchequer that we might get some little concessions if we are lucky, but what is needed are some very large concessions if we are to make any headway at all in the competitive world we are now in.

The present administration at least appear to be doing a little to cut expenditure, but drastic cuts are obviously called for. While political parties are able to bribe the electorate with promises of something we cannot afford, Britain will of necessity become poorer and poorer instead of richer and richer. I feel that directors of companies have a responsibility to the rest of the community to go on pressing for expenditure reductions and tax reductions as the Governments of the day have taken far too little notice of the continued warnings given to them by the industrial community over the last few years, and the present shocking national condition is a direct result of ignoring the advice which the industrial leaders have given.

Heavy Demand for New Products

Our business is very active; we have many new products in the market and in development which show great promise, and new methods are being introduced continuously by our development department. During the year our cable turnover has increased considerably even though margins of profit on certain of the lines were less than last year.

We have been able to keep all our departments fully occupied during the year and we have certain new products which are in very heavy demand.

Our policy is to produce more at lower prices, and by doing so we believe we can maintain our profit figures, and we look forward to the future with cautious optimism.

Our subsidiary company, Nettle Accessories Ltd., has done well this year, and we have received an increase in the dividend due to us of 250% as against 200% last year.

Aycliffe Industries Ltd., which was our own African subsidiary company, is no longer a subsidiary; the local directors have exercised their option, with the result that the company and its capital is South African controlled. We shall receive a bonus this year of 100% on the capital invested in this African company.

The parent company during the year have developed new television aerial equipment, which at present is in very big demand, and Aerialite television aerials can be seen everywhere, even as far away as Canada and Venezuela, where we are sending nice quantities. Our order book is in good shape. Many more architects and consultants are specifying both our "Ashton" rubber cables and our polythene cables, which are marketing under the trade name of "Ashathene."

The Accounts

You will note that there is a profit before tax of £[illegible]30,681 for Aerialite, Ltd. (and a profit of £154,979 for the group excluding the African company which no longer appears in the consolidated account), out of which it is necessary to allocate 61.3% (£80,056) for income and profits tax. Dividends to Preference and Ordinary shareholders take 29.1%. You will note that the balance sheet has been strengthened by the increase in capital reserves of £50,615 and the carry-forward on the profit and loss account has increased by £16,671. Current liabilities have been reduced by £101,166 and the current assets have increased by £28,158. The carry-forward of the group has increased by £23,027.

Your directors recommend a final dividend of 55%, which we wish to point out is now being paid on the increased capital, making a total of 88¼% for the year.

The report was adopted. 3167

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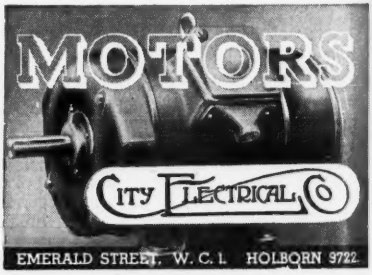

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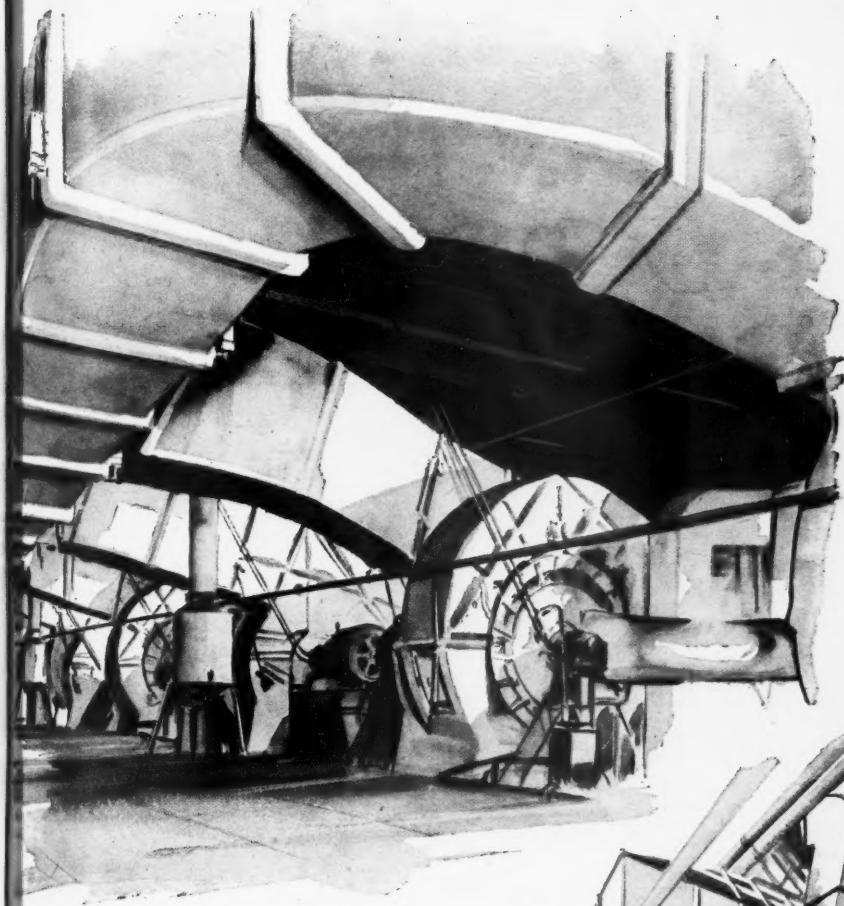

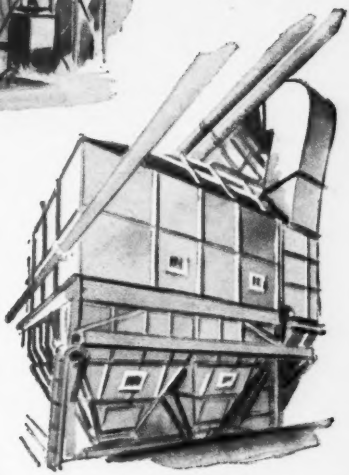

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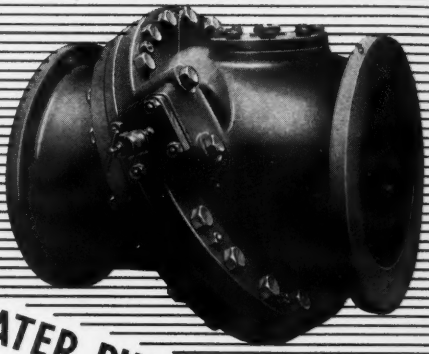

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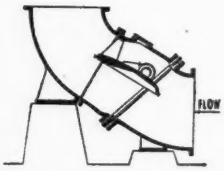

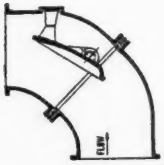

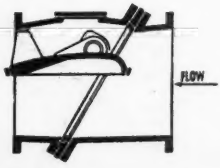

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